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## Original Communications

*Symposium on Rheumatic Fever*

### RHEUMATIC FEVER AND THE AMERICAN ACADEMY OF PEDIATRICS—GENERAL PURPOSE AND SCOPE


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THE Committee on Rheumatic Fever is, I believe, the youngest of all the Academy committees, and if this symposium tonight can be taken as a measure of its growth, then we can be sure that it has survived the first year in its development and is now not only able to stand on its feet, but also has taken a few steps forward.

The primary purpose and scope of this symposium on rheumatic fever is to focalize our thinking on this disease and to bring here, in free discussion, the many problems which confront all workers in this important field of public health. Gathered here, from different points of the compass, are those who are best qualified to speak and to discuss the many phases of the control of the disease. We are indeed fortunate to have such a representative group, and we are grateful that they should come, in these busy days and with travel difficult, to participate in this meeting. We can assure them that the occasion will be rewarding for all those assembled at this Wartime Conference on Child Health.

We must face the fact that rheumatic fever is one of the most serious diseases of childhood, and that it is a threat to the life and health of a large number of children in this country. Because the disease is not reportable except in a few cities and states, it is not possible to speak with accuracy as to numbers. However, it is estimated that about forty thousand lives in all age groups are taken each year by rheumatic heart disease or carditis, the most serious of the sequelae of rheumatic fever. The average age of death is about 30 years. Further, there are estimated to be from eight hundred thousand to one million individuals afflicted with rheumatic heart disease, and that this incapacitates about 1 per cent of our wage-earning population. In military life rheumatic fever has become a problem of large proportions. If World War I figures are comparable, we may expect about fifty thousand men and women of the Armed Forces in World War II to be afflicted with rheumatic fever and


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rheumatic heart disease. This, in itself, poses a large problem for the Veterans' Administration. The number of men rejected from the Selective Service examinations is a matter of some concern.

We should keep constantly in mind that rheumatic fever is essentially a disease of childhood and that it has its genesis in the early years of life. There is a high mortality rate in the first five years following the primary infection. Those who survive bring to their adolescent and young adult years handicaps of varying degrees. The word handicap has been used advisedly. I am of the opinion that we should get away from the term crippled child and speak rather of the handicapped child, when referring to children with rheumatic heart disease. The connotation is less direful both to the child and to the parents.

The Academy, then, has a large responsibility, and an opportunity, to give something more than lip service to a public health problem of no mean proportions, which affects the life and health of so many children in our country. There has been a spreading interest by the Academy in the problem of rheumatic fever which has manifested itself in the formation of the Council on Rheumatic Fever and in the activities of the Children's Bureau programs, now operative in seventeen States and approved in two other States. In such a chronic and recurring infection as is rheumatic fever, the Academy is concerned with the school and educational life of these children and through its collateral committee, that of School Health, there should be a close integration. The close cooperation between the school physician, the school nurse, the medico-social worker and the pediatrist or family physician is important in the total care.

The vast majority of these children is not seen in our private offices but in the clinics and wards of our hospitals. They come in large measure from underprivileged families where a poor hygienic environment is more often the rule than the exception, and undernutrition, cold, and overcrowding play an important role in the susceptible individual in the production of the rheumatic state.

The time has come when we should determine what responsibility we have and what role the Academy should take in the development of a growing public health problem. It is here that lines of professional responsibility and opportunity will cut across lines of cost of medical care in a field of public health. Public funds will be necessary to carry on a long-term program. Programs are already being carried out, in part, in seventeen States under the egis of the Children's Bureau and funds approximating four hundred and seventy thousand dollars will be set aside for that purpose in the year 1945.

We hope that a plan of administration may be worked out which will be satisfactory to all concerned and that the Academy will take an increasingly important role in this important and urgent field of child health.

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# SALICYLATE THERAPY IN ACUTE RHEUMATIC FEVER*

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THE efficacy of controlled salicylate therapy in the treatment of acute rheumatic fever has been recently emphasized by Coburn.[1] By giving large doses of sodium salicylate, he maintains the plasma salicylate level above 350 gammas per cubic centimeter. He stresses the importance of maintaining such a level in order to produce a prompt and progressive subsidence of the rheumatic process.

We have treated a small series of cases of acute rheumatic fever in a similar manner.

The only cases selected for the study were those in which a definite diagnosis could be made from clinical and laboratory data. Usually no therapy was instituted for twenty-four hours to permit preliminary studies. Since all other criteria used to establish the diagnosis could not be used to follow the course of the disease, the erythrocyte sedimentation rate (E. S. R.) was used as the main criterion of rheumatic activity and was determined frequently. As the determination of the erythrocyte sedimentation rate is a test which is not specific for acute rheumatic fever, other causes for its elevation were searched for carefully. Serum salicylate levels were determined by the colorimetric method of Brodie, Udenfriend, and Coburn[2] every day and, when the serum level became stabilized, every other day. Salicylate therapy was continued for two weeks after the first normal erythrocyte sedimentation rate was obtained (below 20 mm. in one hour).

"Optimal" serum salicylate levels, that is, levels between 350 and 500 gammas per cubic centimeter of serum, were maintained. Such levels were called "optimal" and will be referred to as "optimal" because levels above 500 gammas in some patients produce vomiting, hyperpnea, tachycardia, drowsiness, hallucinations and because levels below 350 gammas are, according to Coburn, less efficacious. A few patients received sodium salicylate intravenously: from 7 to 10 Gm. dissolved in from 250 to 500 c.c. of normal saline were administered over a period of from one to two hours every day for a few days. Although "optimal" levels were quickly reached by this method of administration, it was observed that the salicylate level had fallen far below "optimal" values by the time of the next infusion. Such fluctuations seemed undesirable and were avoided later by using combined intravenous and oral routes of administration.

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*To be published in extenso elsewhere.

Most patients received their salicylate by mouth. Enteric coated tablets of 0.3 Gm. of sodium salicylate were used. The vomiting, which so frequently occurs after the ingestion of aspirin or sodium salicylate, was almost entirely eliminated by the use of enteric coated tablets. Sodium bicarbonate, contrary to the usual custom, was not given since it is known to depress the serum salicylate level.[3] The maintenance dose in our series ranged from 0.9 to 1.8 Gm. of sodium salicylate given every four hours day and night, the main determinant of the size of the dose being the weight of the patient. It was adjusted from day to day according to the level obtained. To reach high serum salicylate levels quickly with oral administration alone, doses twice the amount assumed to be the maintenance dose were given every four hours for four doses. The maintenance dose was then given every four hours day and night. With such a method of administration, "optimal" levels were reached within the first twenty-four hours.

When "optimal" levels were maintained in a patient throughout the course of his disease, such a regimen will be referred to as "adequate salicylate therapy."

## RESULTS

Seventeen patients (nineteen attacks) with acute rheumatic fever received "adequate" salicylate therapy. The course of the disease in this "adequately" treated group was compared with the course of the disease in a control group. This control group consists of seven of our own patients who were "inadequately" treated for various reasons and twelve patients with well-documented acute rheumatic fever admitted to the Presbyterian Hospital during the year, 1943. Our seven patients were considered as controls either because "optimal" levels were never reached or because, when reached, were maintained for only very short periods of time. The other twelve patients of the control group never received more than 3.6 Gm. of sodium salicylate per day, some of them with equivalent amounts of sodium bicarbonate. Although salicylate levels never were determined, it is a very safe assumption that their serum salicylate level never was above from 200 to 250 gammas per cubic centimeter, if that high. The two groups were comparable as to age, number of previous attacks of rheumatic fever, and duration of the acute attack before hospitalization.

Using the erythrocyte sedimentation rate as the criterion of activity of the rheumatic process, there was no difference in the response of the two groups. Table I shows that at the end of two weeks of hospitalization, the erythrocyte sedimentation rate was still above 20 in every case in both groups. At the end of three weeks, the erythrocyte sedimentation rate was still elevated in sixteen patients of the control group and in seventeen patients of the "adequately" treated group. The response was similar in both groups after four, five, and six weeks of hospitalization.

TABLE I

| | 2 WEEKS | 3 WEEKS | 4 WEEKS | 5 WEEKS | 6 WEEKS |
|---|---|---|---|---|---|
| 1. Control group (19 patients) | 19 | 16 | 12 | 8 | 4 |
| 2. Adequately treated group (17 patients, 19 attacks) | 19 | 17 | 13 | 9 | 6 |

Number of patients in whom the E.S.R. was still above 20 mm./1 hour.
(1) in the control group of 19 patients
(2) in the "adequately" treated group (19 attacks in 17 patients) after 2, 3, 4, 5 and 6 weeks of hospital stay.

When the course of the attack of acute rheumatic fever is compared in the "adequately" treated group and in the control group, it is obvious that "adequate" salicylate therapy did not shorten the course of the disease. It is possible, however, that, had "adequate" salicylate therapy been instituted within a few days of the onset of rheumatic fever, the course of the disease might have been shortened. This cannot be determined from our study as most of our patients were treated sometimes several weeks after the onset of their symptoms of acute rheumatic fever and as only three patients were treated within one week of the onset of the attack of acute rheumatic fever. It is worthy of note, however, that two of these three patients responded promptly, the erythrocyte sedimentation rate falling below 20 during the third week of "adequate" salicylate therapy.

## CONCLUSION

The course of an attack of acute rheumatic fever was compared in two groups of patients. One group was "adequately" treated—maintenance during the course of the disease of serum salicylate levels ranging between 350 and 500 gammas per cubic centimeter. The other group received such doses of salicylate that serum levels in most patients were constantly below 250 gammas per cubic centimeter and in a few patients, reached "optimal" levels only for short periods of time. The course of the disease was not shorter in the "adequately" treated group. It is possible that institution of "adequate" salicylate therapy within a week or two of the onset of the disease might shorten its course.

## REFERENCES

1. Coburn, A. F.: Bull. Johns Hopkins Hosp. 73: 435, 1943.
2. Brodie, B. B., Udenfriend, S., and Coburn, A. F.: J. Pharmacol. & Exper. Therap. 80: 114, 1944.
3. Smull, K., Wégria, R., and Leland, J.: J. A. M. A. 125: 1173, 1944.

# ACUTE SALICYLATE POISONING

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FATAL intoxication is not infrequent and has occurred in about 50 per cent of subjects developing symptoms serious enough to lead to hospitalization. On the other hand suicidal attempts have often been failures despite ingestion of large quantities of the salicylate drugs. No close relationship between dosage and symptoms exists, but experimental observations indicate that with blood concentrations which are likely to be obtained during "intensive" therapy, toxicity may result without the requirement of unusual individual susceptibility.

Studies on the antipyretic effects of the salicylates indicate that their action is chiefly on the hypothalamus, and leads to both increased heat production and heat loss. Pain is relieved chiefly by their depressant action on the optic thalami. Respiration is at first stimulated and then depressed. Following periods of restlessness and excitement, stupor and coma frequently occur. In fatal cases gastric hemorrhages, liver damage and renal injury with functional failure have been described. Reduced coagulability of the blood with hypoprothrombinemia may occur. Depletion of liver glycogen and tissue depletion of vitamin C with increased urinary excretion have been noted. Plant, animal and yeast enzyme systems are affected, and the respiration of rat liver and kidney slices is reduced by M/10 concentration of salicylates.

Seven infants and one 4-year-old child have been admitted to the St. Louis Children's Hospital during the last ten years with severe symptoms of intoxication. Three died—exactly the same number as died from sulfonamide drug intoxication during a slightly shorter period. Except in one instance when a 20-month-old infant found a box of 5 grain sodium salicylate tablets and swallowed an undetermined number (later vomiting 14 partially disintegrated tablets), all had been given salicylates for therapeutic reasons, either at the customary dosage of one grain per year repeated every four hours or else no more than four times such amounts. After first showing the relatively mild symptoms of "salicylism," usually within twenty-four hours of the beginning of drug administration, all developed extreme hyperpnoea and became comatose. Four had convulsions. All had real bicarbonate deficit acidosis and very severe ketosis. The three fatal cases showed evidence of circulatory and respiratory failure for some time before death. One of the fatal cases—the only one—had hyperpyrexia. Two others had moderate fever.

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Read at the Annual Meeting of the American Academy of Pediatrics Nov. 9, 1944, St. Louis, Mo.

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We felt that in the five cases recovering, the effective treatment was the large quantities of lactate-Ringer's solution and dextrose given over a number of days and until ketosis had disappeared.

Our conception of what transpires is this: At first there is primary hyperventilation because of central stimulation, which leads to a $CO_2$ deficit type of alkalosis with alkaline urine and moderate compensatory reduction of blood bicarbonate. Then ketosis develops (in one instance also with hypoglycemia) and produces a real bicarbonate deficit acidosis, with a shift to acid urine. Acidemia (reduction of blood pH) may or may not result, depending upon the degree of hyperventilation and whether or not respiratory failure ensues. Ketosis cannot be immediately abolished by administration of glucose or glucose with insulin (the latter to be used with caution because of the tendency toward spontaneous hypoglycemia) and may persist for as long as four or five days, and requires "neutralization" with repeated injections of Na-lactate or sodium bicarbonate, the former preferred because of its glycogenic properties, its greater safety, and ease of administration. After ketosis is finally abolished, salicylates may still be found in the body fluids and there may still remain hyperpnoea from central action with a shift again of the acid-base balance to that of $CO_2$ deficit alkalosis, requiring $CO_2$ inhalation (usually with oxygen) to prevent alkalemia. In fatal cases circulatory and respiratory failure develop.

In the following moving picture illustration, are pictured two infants —the first several hours after partial relief of acidosis, still with characteristic hyperpnea which is all out of proportion to the remaining moderate degree of acidosis (serum $CO_2$ content of 31.6 volumes per cent). This baby recovered. The second (initial $CO_2$ content of 26 volumes per cent) shows the development of circulatory and respiratory failure which continued to progress. The spinal fluid gave a strong test for salicylate.

# SULFONAMIDE PROPHYLAXIS FOR THE PREVENTION OF RHEUMATIC RECURRENCES

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DURING the past eight years the value of the daily prophylactic administration of sulfanilamide to known rheumatic subjects in the inactive stage of the disease, has been studied in eight different clinics or convalescent homes in various parts of the country. Sulfanilamide, rather than one of the newer, less toxic sulfonamide drugs, was used in all these investigations because in 1936 and 1937 when the pioneer work in this field was started by Thomas and France[1] and by Coburn and Moore,[2] sulfanilamide was the only suitable sulfonamide available. Because of the favorable results reported by these workers, and probably also because sulfadiazine and sulfamerazine were not always obtainable or were too expensive, subsequent investigators have continued to use sulfanilamide.

One of the eight clinics discontinued the study before arriving at any definite conclusions because numerous toxic reactions with one death were encountered.[3] The reports from the other seven clinics are in striking accord.[4, 5, 6, 7, 8] They all agree that this type of prophylaxis is effective in preventing rheumatic subjects from contracting streptococcal upper respiratory infections and that individuals so protected escaped rheumatic relapses.

Most of these studies were conducted in ambulatory patients. My own observations were made in a convalescent home, Irvington House, situated in Westchester County, N. Y., where the children who served as controls and those receiving prophylactic sulfanilamide lived under identical conditions and where careful bacteriologic and serologic determinations could be made. The data obtained have already been published in detail.[5, 9] The significant findings may be briefly summarized as follows:

In the institution during two successive winters the 108 children ranging in age from 7 to 15 years were divided into two groups matched as closely as possible in regard to age, sex, number and severity of previous rheumatic attacks, and cardiac lesions. All the patients were in the inactive stage of the disease. One group received daily prophylactic doses of sulfanilamide from October until June. An average blood level of from 1.5 to 2 mg. per cent was maintained. The children in the other group served as controls.

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*Control Group.*—During each of the two winters an outbreak of streptococcal upper respiratory infections occurred among the children in the control group. In 1940-1941, thirty of the fifty-four children serving as controls contracted streptococcal pharyngitis due to Group A streptococcus type 15. Following a latent period fourteen of these thirty patients developed definite rheumatic recurrences. In 1941-1942, eighteen of the fifty children in the control group contracted pharyngitis due to Group A streptococcus type 36. Following a latent period nine of these eighteen patients developed definite rheumatic manifestations.

*Sulfanilamide Group.*—In 1940-1941, only one child of the fifty-four receiving sulfanilamide contracted pharyngitis due to streptococcus type 15 and she escaped rheumatic sequelae. In 1941-1942, one boy of the fifty-four receiving sulfanilamide contracted pharyngitis due to streptococcus type 36. Following a latent period he developed mild rheumatic manifestations.

Thus a striking difference between the two groups of children was observed both in the incidence of streptococcal upper respiratory infections and of rheumatic recurrences.

Twenty-three children, who remained in the institution during both years, showed no signs of hypersensitivity when sulfanilamide was resumed after a lapse of four and one-half months. There was no significant difference in weight gain between the children who received sulfanilamide and those who served as controls.

During the present war sulfonamide prophylaxis has been widely used in our Armed Forces. In controlled studies both among Navy personnel and among members of the Army Air Force, the prophylactic administration of sulfadiazine has resulted in a striking reduction in the incidence of streptococcal upper respiratory infections and following a lag of several weeks a similar reduction in the incidence of rheumatic fever.[10, 11] These investigations have therefore confirmed the findings obtained in civilian practice. The fact that sulfonamide prophylaxis greatly reduces the incidence of streptococcal upper respiratory infections and thus protects susceptible individuals from developing rheumatic manifestations can no longer be doubted.

Prophylactic sulfadiazine has been used on such a vast scale by both the Navy and the Army Air Force that reliable data on the incidence of toxic reactions have been obtained. Coburn reported mild toxic manifestations in 0.5 per cent and severe in 0.01 per cent. No renal complications were observed. Most of the mild reactions were dermal and half of the individuals who developed skin manifestations proved not to be sensitive when retested. The severe reactions encountered were: exfoliative dermatitis and granulocytopenia. These symptoms were found to be reversible if the drug was discontinued promptly. Holbrook reported one patient with hemolytic anemia who responded well to transfusion.

Since the incidence of toxic reactions is less with sulfadiazine than with sulfanilamide, and also because it is possible to maintain an adequate blood level with a single daily dose, sulfadiazine is, in my opinion, the drug of choice for sulfonamide prophylaxis.

Aside from the hazard of toxic reactions, what other undesirable effects may the widespread use of sulfonamide prophylaxis produce? The following possibilities should be considered:

The prophylactic administration of sulfadiazine may sensitize the individual so that he will be unable to tolerate therapeutic doses. Both Holbrook and Coburn stated that men who had received prophylactic doses showed no untoward reactions when they developed acute infections which required therapeutic doses.

Sulfadiazine prophylaxis may produce sulfa-resistant strains of streptococci. Laboratory studies on this problem are still incomplete, but so far the frequent occurrence of resistant strains has not been observed.

Patients who receive sulfadiazine over a period of years may be unduly susceptible to infection when the drug is withdrawn. At the present time no data are available to answer this question.

The administration of a toxic drug to young children for five years or longer may interfere with normal growth and development and exert a delayed deleterious effect on the bone marrow.

In spite of these disadvantages, in my opinion, sulfonamide prophylaxis is the only concrete measure now available which will reduce the mortality and morbidity due to rheumatic fever. In starting a program of sulfadiazine prophylaxis for rheumatic patients, it should at first be limited to children and adolescents with the least favorable prognosis. Most students of rheumatic fever agree that children, who develop typical attacks of rheumatic carditis or polyarthritis before the age of 8 years, often develop serious heart disease. Further attacks should be prevented until the age of puberty and it may become necessary to give the drug for a period of from five to eight years. Children and adolescents who have developed definite valvular lesions, especially if accompanied by cardiac enlargement, are particularly prone to rheumatic relapses and should therefore be protected by sulfadiazine prophylaxis. Since toxic manifestations are most likely to occur shortly after the drug is started, it seems best to continue sulfadiazine throughout the year rather than risk the possibility of an untoward reaction each time sulfonamide prophylaxis is resumed. Furthermore, streptococcal upper respiratory infections occasionally occur during the summer months and may precipitate rheumatic recurrences.

In initiating a program of sulfonamide prophylaxis for rheumatic patients, it should be clearly recognized that this type of treatment is not the final answer to the problem of rheumatic fever. The effective-

ness of the sulfonamide drugs in preventing recurrences of rheumatic fever proves the importance of Group A beta hemolytic streptococci as a factor in the etiology of this disease, but as yet we are completely ignorant of how these microorganisms cause the symptomatology of rheumatic fever. The possibility that some other unknown agent or virus acts in conjunction with streptococci has not been definitely excluded.

What we need most of all is further research to clarify the etiology of rheumatic fever and to develop new methods of combating streptococci based on the stimulation of a comprehensive immunity rather than on chemotherapy.

REFERENCES

1. Thomas, C. B., and France, R.: Bull. Johns Hopkins Hosp. **64**: 67, 1939.
2. Coburn, A. F., and Moore, L.: J. Clin. Investigation **18**: 147, 1939.
3. Stowell, D. D., and Button, W. H.: J. A. M. A. **117**: 2161, 1941.
4. Hansen, A. E., Platou, R. V., and Dwan, P. F.: Am J. Dis. Child. **64**: 963, 1942.
5. Kuttner, A. G., and Reyersbach, G.: J. Clin. Investigation **22**: 77, 1943.
6. Chandler, C. A., and Taussig, H. B.: Bull. Johns Hopkins Hosp. **72**: 42, 1943.
7. Dodge, K. G., Baldwin, J. S., and Weber, M. W.: J. PEDIAT. **24**: 483, 1944.
8. Feldt, R. H.: Am. J. M. Sc. **207**: 483, 1944.
9. Kuttner, A. G.: New York State J. Med. **43**: 194, 1943.
10. Holbrook, W. P.: J. A. M. A. **126**: 84, 1944.
11. Coburn, A. F.: J. A. M. A. **126**: 88, 1944.

# RHEUMATIC HEART DISEASE AND THE PHYSICAL FITNESS OF THE NATION AS SEEN BY SELECTIVE SERVICE

COLONEL LEONARD G. ROWNTREE, MEDICAL RESERVE*
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YOU assembled here today are primarily interested in the problems of rheumatic fever and of rheumatic heart disease. Through the eyes of Selective Service, it is possible perhaps for you to visualize better your particular problem in relation to the general health problem of the nation.

Medicine has played an indispensable role in the creation of our Armed Forces. For nearly four years, doctors have been examining and passing judgment on innumerable thousands of registrants. By January of this year more than 13,000,0000 examinations were completed. This unprecedented mass of medical data is now being subjected to statistical analyses. Both in quality (medical procedure and judgment) and in quantity (numbers involved) this material far surpasses that of any other health survey ever made in the history of our nation.

While the primary objective of these examinations was the selection or rejection of men for the military service, there has emerged as a by-product, a picture of the health needs of the nation. The knowledge of the medical profession about the physical state and health of the American people has been widened and deepened by the Selective Service experience. Perhaps in no other way could this end have been obtained. The medical profession, in doing this work, has itself acquired the knowledge, has revealed the national needs, and now it must come forward with a program to meet these needs. Medicine, in a spirit of service, in a great and effective way, has helped to create our military establishment and has aided fundamentally in solving the war manpower mobilization problem and, in addition, has visualized as never before our health needs. Now that medicine has the diagnoses, remedy should be suggested and treatment begun.

## THE MEDICAL FUNCTION OF SELECTIVE SERVICE

In five registrations between Oct. 16, 1940, and July 30, 1942, all the males between 18 and 65 years of age have been registered. Twenty-nine million fall between the ages of 18 and 45, but only 22,000,000 men, those between 18 and 37 years of age, are subject to induction. It is the function of Selective Service to classify all men within the 18- to 45-year range, and it is the function of the Medical Division to advise

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the local boards as to the physical requirements for acceptance into the fighting forces. It is in this connection that medicine has given freely of itself and has done a stupendous and magnificent job. In this program some 33,000 doctors and 10,000 dentists have participated as examining physicians attached to local boards or as members of the medical advisory boards. All such service has been gratuitous. In addition, the medical advisory boards, now some 812 in number, have rendered expert medical judgment through their 8,000 to 10,000 members. The state medical officers, one or more in each state, coordinate the medical work of the local boards within the states and also serve as chief medical liaison officers between national and state headquarters.

The results of all medical examinations have been recorded on special forms provided for the purpose (in the beginning, Form 200, subsequently, Form 221). Copies of all completed forms, more than 13,000,000, have been filed in the Philadelphia Branch of the Division of Research and Statistics of the Selective Service System. Thus it is possible for appropriate authorities to obtain at will the record of any individual registrant provided he is properly identified.

### THE PRESIDENT'S PLAN FOR REHABILITATION OF REGISTRANTS

The medical statistics compiled by Selective Service for peacetime procurement of men for the Armed Forces revealed a 50 per cent rejection rate in the first 2,000,000 examined and 52.8 per cent in the first three million. The original figures for rejection were so high that the President formulated a rehabilitation program in October, 1941, which unfortunately was never put into general effect. His plan provided that 200,000 at least be rehabilitated under the auspices of Selective Service and its nationwide network of boards, that the rehabilitation be carried out in the registrant's home community by Selective Service in conjunction with the local county medical and dental societies and that this be effected at a reasonable cost for which adequate funds would be forthcoming.

Obviously this problem was extremely complex. It called for good judgment as well as adequate remedial measures and for cooperation on the part of all those interested in the healing art. In consequence, a meeting was called by Selective Service at National Headquarters, bringing together representatives of the schools and hospitals, of the American Medical and Dental Associations, of the Defense Health and Welfare Services to the War Manpower Commission, of the Council of National Defense and of certain Federal and social agencies. The problems of rehabilitation were thoroughly discussed and, to some extent, the interest and the role of each and all of these organizations defined.

Army experience teaches that only certain types of cases are susceptible of satisfactory rehabilitation. In consequence, it was decided to limit rehabilitation to these types. In conference with the Surgeon General, it was further determined to limit rehabilitation to registrants

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The results of all medical examinations have been recorded on special forms provided for the purpose (in the beginning, Form 200, subsequently, Form 221). Copies of all completed forms, more than 13,000,000, have been filed in the Philadelphia Branch of the Division of Research and Statistics of the Selective Service System. Thus it is possible for appropriate authorities to obtain at will the record of any individual registrant provided he is properly identified.

### THE PRESIDENT'S PLAN FOR REHABILITATION OF REGISTRANTS

The medical statistics compiled by Selective Service for peacetime procurement of men for the Armed Forces revealed a 50 per cent rejection rate in the first 2,000,000 examined and 52.8 per cent in the first three million. The original figures for rejection were so high that the President formulated a rehabilitation program in October, 1941, which unfortunately was never put into general effect. His plan provided that 200,000 at least be rehabilitated under the auspices of Selective Service and its nationwide network of boards, that the rehabilitation be carried out in the registrant's home community by Selective Service in conjunction with the local county medical and dental societies and that this be effected at a reasonable cost for which adequate funds would be forthcoming.

Obviously this problem was extremely complex. It called for good judgment as well as adequate remedial measures and for cooperation on the part of all those interested in the healing art. In consequence, a meeting was called by Selective Service at National Headquarters, bringing together representatives of the schools and hospitals, of the American Medical and Dental Associations, of the Defense Health and Welfare Services to the War Manpower Commission, of the Council of National Defense and of certain Federal and social agencies. The problems of rehabilitation were thoroughly discussed and, to some extent, the interest and the role of each and all of these organizations defined.

Army experience teaches that only certain types of cases are susceptible of satisfactory rehabilitation. In consequence, it was decided to limit rehabilitation to these types. In conference with the Surgeon General, it was further determined to limit rehabilitation to registrants

who could be certified by the Army in advance as acceptable on completion of the rehabilitation specified. This plan obviously eliminated all waste effort and expense and limited rehabilitation to those who could subsequently be accepted into the military forces.

Shortly after the rehabilitation program was suggested, the Japanese made their attack on Pearl Harbor. As a result, the pressure for fighting men became extreme, and most of the registrants scheduled for rehabilitation were inducted status quo and without the correction of their defects. Later the plan was pilot tested in Maryland and Virginia. The results were relatively meager. General Hershey decided, therefore, not to continue the plan but turned the whole problem over to the War Manpower Commission, which had been created in the interim.

### PREHABILITATION

The President's plan provided for the rehabilitation of 200,000 men for service with the Armed Forces. It did not, however, solve the much greater problem of the lack of physical fitness and the prevalence of deficiencies and defects among other men of military age or among the civilian population as a whole. In this connection Selective Service offered its own plan—the plan of prehabilitation—which provided for a campaign of education concerning the standard requirements of the Army, the examination by the family doctor or dentist of those men who fall short of these requirements, the correction of remediable defects found by the doctor or dentist concerned on the usual doctor-patient relationship, and the certification of prehabilitation by the doctor responsible for the correction of the defects.

This plan invited every registrant and every young man in the nation to fit himself for examination and, if acceptable, for service with troops or industry. It emphasized the desirability of not permitting minor defects to defeat major objectives. It is particularly applicable in universities, colleges, and schools all over the country, as also in labor and industry. The fact that defects are prevalent, as evidenced by the surveys of Selective Service, indicates a widespread need for improvement in physical fitness and health. This campaign accomplished much, particularly in making the nation conscious of national health needs and in laying the foundation for programs for physical restoration and physical training and for programs of prevention.

*Lowering of Standards for Induction and Rehabilitation in the Military Establishments.*—One other result of the high rejection rate was the lowering of standards for induction. These standards have now been placed at the lowest level compatible with advantageous induction of men for the fighting forces. So low were the requirements in several fields, notably in dentistry, illiteracy, venereal diseases, and hernia, that it became necessary in these groups to set up a rehabilitation system within the military establishment. No civilian program of rehabilitation has compared in efficiency with that of the Armed Forces.

*The Present Size and Composition of the 4F Pool.*—It seems desirable at this juncture to consider the size and composition of the 4F pool as it exists at present. This furnishes a much needed perspective. The 4F pool has grown steadily during the past four years. This has continued despite the drastic lowering of standards, which has included among other changes the induction of limited numbers of men with uncomplicated venereal disease, with hernia, and illiterates, and large numbers of men with dental defects. The size and composition of the 4F pool at present is shown in Table I.

Despite all that has been done to date, the 4F pool has continued to grow.

TABLE I

ESTIMATED PRINCIPAL CAUSES FOR REJECTION OF REGISTRANTS FROM 18-37 YEARS OF AGE IN CLASS IVF AND CLASSES WITH "F" DESIGNATIONS*

OCT. 1, 1944

| PRINCIPAL CAUSE FOR REJECTION | NUMBER | | | PER CENT | | |
|---|---|---|---|---|---|---|
| | TOTAL | WHITE† | NEGRO | TOTAL | WHITE† | NEGRO |
| Total | 4,366,000 | 3,507,000 | 859,000 | 100.0 | 100.0 | 100.0 |
| Manifestly Disqualifying Defects | 459,100 | 396,400 | 62,700 | 10.5 | 11.3 | 7.3 |
| Mental Disease | 737,400 | 650,800 | 86,600 | 16.8 | 18.6 | 10.1 |
| Mental Deficiency‡ | 605,000 | 332,000 | 273,000 | 13.9 | 9.5 | 31.8 |
| Physical Defects | 2,498,900 | 2,075,100 | 423,800 | 57.3 | 59.1 | 49.3 |
| Musculoskeletal | 329,600 | 292,000 | 37,600 | 7.6 | 8.3 | 4.4 |
| Cardiovascular | 286,100 | 238,200 | 47,900 | 6.6 | 6.8 | 5.6 |
| Syphilis | 274,800 | 110,000 | 164,800 | 6.3 | 3.1 | 19.2 |
| Hernia | 245,400 | 217,200 | 28,200 | 5.6 | 6.2 | 3.3 |
| Neurological | 221,000 | 197,900 | 23,100 | 5.1 | 5.6 | 2.7 |
| Eyes | 218,800 | 193,600 | 25,200 | 5.0 | 5.5 | 2.9 |
| Ears | 169,100 | 164,100 | 5,000 | 3.9 | 4.7 | 0.6 |
| Tuberculosis | 118,100 | 105,900 | 12,200 | 2.7 | 3.0 | 1.4 |
| Lungs | 76,100 | 66,800 | 9,300 | 1.7 | 1.9 | 1.1 |
| Underweight and overweight | 63,700 | 59,300 | 4,400 | 1.5 | 1.7 | 0.5 |
| Abdominal viscera | 56,800 | 54,300 | 2,500 | 1.3 | 1.6 | 0.3 |
| Feet | 56,800 | 43,800 | 13,000 | 1.3 | 1.3 | 1.5 |
| Kidney and urinary | 46,300 | 41,900 | 4,400 | 1.1 | 1.2 | 0.5 |
| Varicose veins | 44,800 | 39,600 | 5,200 | 1.0 | 1.1 | 0.6 |
| Genitalia | 43,800 | 34,200 | 9,600 | 1.0 | 1.0 | 1.1 |
| Endocrine | 41,400 | 39,700 | 1,700 | 0.9 | 1.1 | 0.2 |
| Teeth | 36,200 | 33,900 | 2,300 | 0.8 | 1.0 | 0.2 |
| Skin | 27,300 | 24,100 | 3,200 | 0.6 | 0.7 | 0.3 |
| Neoplasms | 27,300 | 24,800 | 2,500 | 0.6 | 0.7 | 0.3 |
| Nose | 26,200 | 25,100 | 1,100 | 0.6 | 0.7 | 0.1 |
| Gonorrhea and other venereal | 18,400 | 7,300 | 11,100 | 0.4 | 0.2 | 1.3 |
| Hemorrhoids | 17,900 | 15,000 | 2,900 | 0.4 | 0.4 | 0.3 |
| Mouth and gums | 11,300 | 10,500 | 800 | 0.3 | 0.3 | 0.1 |
| Infectious and parasitic | 4,800 | 4,200 | 600 | 0.1 | 0.1 | 0.1 |
| Throat | 4,300 | 3,700 | 600 | 0.1 | 0.1 | 0.1 |
| Blood and blood forming | 4,100 | 3,600 | 500 | 0.1 | 0.1 | 0.1 |
| Other medical | 28,500 | 24,400 | 4,100 | 0.7 | 0.7 | 0.5 |
| Nonmedical | 65,600 | 52,700 | 12,900 | 1.5 | 1.5 | 1.5 |

*Includes registrants in Classes IIA, B, and C with "F" designations.

†Includes all races other than Negro.

‡Includes (1) registrants with more than one disqualifying defect who were rejected for educational deficiency prior to June 1, 1943; (2) registrants rejected for failure to meet minimum intelligence standards beginning June 1, 1943; (3) morons, imbeciles, and idiots rejected November, 1940—September, 1944.

*Lack of Physical Fitness and Need for Physical Training.*—Not only do the defects, deficiencies, disabilities, disorders and diseases abound, but, in addition, many of the registrants were found to be pampered, soft, flabby, and in need of conditioning. Special training in physical fitness was necessary after induction, which represented weeks of wasted time and effort which could have been avoided if every young man prior to induction had made himself physically fit.

Lack of physical fitness prevailed among the youth of the country because the nation failed to recognize its importance and because youth itself failed to earn fitness. Where does the fault lie? The present situation is the result of indifference and apathy on the part of the government, states, municipalities, parents, and, to a certain extent, of youth itself. It is in a large measure failure in our educational system and our homes. The failure is a combined one; youth is the victim. Only concerted efforts of all those concerned in the failure can bring about the cure or, what is still more important, prevention for the future.

Physical fitness is a matter of development. The attributes essential to success in war and combat are strength, endurance, stamina, special agilities, leadership, initiative, emotional stability, and the indomitable "will to win." Physical fitness is the bodily state which combines maximum power and efficiency. It cannot be acquired overnight. It is a matter of evolution. It calls for time and for graded training in the development of the body and mind to maximum efficiency.

## THE NATIONAL MOVEMENT FOR PHYSICAL FITNESS: WHAT HAS BEEN ACCOMPLISHED

The present movement has been under way over a period of three years. Progress has been slow, especially in the beginning in that period which might be regarded as the time of seeding. This covered a period of two years. Only recently have some things begun to sprout. Several steps may be enumerated:

1. Selective Service published statistics on rejections in the summer of 1941, emphasizing the fact that 50 per cent of the registrants examined failed to qualify by reason of physical and/or mental defects and educational deficiencies. Selective Service advocated national prehabilitation which succeeded in creating some mild interest in the problem and a response on the part of education in setting up the Victory Corps and State Programs for Physical Fitness.

2. On Oct. 16, 1941, the President outlined a rehabilitation program designed to fit some 200,000 rejectees for service. This failed to yield material results mainly because it coincided with more imperative and greater demands—the immediate procurement of vastly greater manpower following the attack on Pearl Harbor.

3. The President created the National Committee on Physical Fitness under the administrative control of the Federal Security Agency.

4. This National Committee on Physical Fitness set up a special commission which drew up a program for physical fitness in industry.

5. The National Committee on Physical Fitness assembled a national council of 100 distinguished citizens to advise them in the various fields of activity.

6. The National Committee on Physical Fitness invited the wholehearted participation of medicine, which resulted in the creation of the Joint Committee on Physical Fitness with equal representation for medicine and the Committee on Physical Fitness of the Federal Security Agency. The responsibility is now a joint one.

7. The Joint Committee convened the National Council in a two-day session in which were set up programs for work in various fields: Institution Groups—such as the church, Y. M. C. A., and others; Labor, Management, Schools and Colleges, State-Local Organizations, Medical Affiliates, and so on. These plans are under study; some have been ratified already and are now being carried out.

8. The Joint Committee has set up a platform of seven objectives:

1. Help each American to learn physical fitness needs.
2. Protect against preventable defects.
3. Attend to correctable habits.
4. Know how to live healthfully.
5. Act to acquire physical fitness.
6. Set American standards of physical fitness at high levels.
7. Provide adequate means for physical development.

9. The Joint Committee has determined the scope of its function and the proceedings and measures to be employed.

The program includes the following:

1. The fullest use of every means of promotion and education.
2. The increased assumption of responsibility on the part of schools and colleges.
3. The development of responsibility by national organizations and agencies. This would include such groups as management and labor, social and religious agencies, patriotic organizations, civic groups, and youth and sports organizations.
4. The increased assumption of responsibility on the part of Federal, State and local governments as a public necessity to take their proper place in providing easily accessible opportunities for the improvement of physical health.
5. The enlistment of the active support of organizations of professional workers interested in the development and maintenance of physical fitness.
6. The utilization of the resources of industries applicable to the field of physical fitness.

The following factors are all considered important in physical fitness:

1. Adequate health inventories and services for the correction of remediable defects.
2. Proper nutrition.
3. The practice of personal hygiene, particularly cleanliness, adequate daily recreation, exercise, rest and sleep.
4. Healthful living conditions.
5. Programs designed to develop strength, agility, skill and endurance.

10. The Joint Committee has made initial contact with the governor of each State and with the commission here in the district in an effort to set up the necessary machinery for adequate state programs—including a state council on health and physical fitness.

11. The National and Joint Committee and the National Council have awakened considerable public interest and support—more than 400 national organizations are harnessing their resources in the common cause.

12. The Joint Committee, representing the Committee on Physical Fitness of the Federal Security Agency, the educational system, medicine and dentistry, has decided to abandon the concept "the year of special emphasis on physical fitness" and to proceed on the basis of a permanent program to meet permanent needs.

13. The Joint Committee is now engaged, through its associated industry groups, in setting up a suitable foundation to handle its finances and the dissemination of information regarding its activities.

14. The Joint Committee has concluded that only programs that make a personal appeal to the individual can have any material success. Consequently, the program must be made attractive to all individuals who are to participate. This is especially true as it applies to youth.

15. Subcommittees are now actively at work in various fields exploring possibilities. Inventories and pilot tests are being set up in the effort to find the best methods of approach.

16. The committee in cooperating actively with the leaders in the field of education for greater emphasis on the teaching of the principles of healthful living and physical training for strength and vigor.

### THE IMPORTANCE OF A NATIONAL COUNCIL FOR ACUTE RHEUMATIC FEVER AND RHEUMATIC HEART DISEASE

Your activities are of the utmost importance in this national movement for physical fitness, especially for two reasons. Cardiovascular disease is now the leading cause of death in this country and it is on the increase, rather than on the decrease. Cardiovascular disease is also one of the principal causes of rejection for military service. It, therefore, constitutes one of our major health problems in both war and peace.

*Rheumatic Fever and Rheumatic Heart Disease in Registrants.*—You will be interested in some statistics compiled at the request of the Children's Bureau of the United States Department of Labor for their conference on Rheumatic Heart Disease, Oct. 5 through 7, 1943.

Registrants with acute, recurrent, or chronic rheumatic fever, or with rheumatic heart disease are not acceptable for service with the fighting forces and are, therefore, classified as 4F. During peacetime most of the registrants rejected for these diseases were disqualified by the examining physicians at the local boards. During wartime, however, the majority of the rejections were made at the Armed Forces induction stations.

Acute rheumatic fever is primarily a disease of childhood and of adolescence. Hence, most registrants are past the high incidence range of rheumatic fever. It is also a serious, painful, and disabling affliction, usually confining the patient to the bed. For these reasons few, if any, registrants with acute rheumatic fever come up for examination. In consequence, the rejections for acute rheumatic fever are minimum while rejections for rheumatic heart disease, which is variously considered as a clinical manifestation, a complication, or a sequela of this disease, are much more frequent.

During peacetime, the results of a sampling survey indicate that 7 cases of acute rheumatic fever and 355 cases of rheumatic heart disease were recorded in every 100,000 registrants examined. It was found relatively oftener among whites than among Negroes.

During the period of November, 1940, through September, 1941, cardiovascular defects accounted for 10.0 per cent of all rejections at the local board level and at the Armed Forces induction stations. The rheumatic nature of rheumatic heart disease was then designated in only 7.3 per cent of the total cardiovascular rejections. It is obvious, however, that valvular disease, which is recorded much more frequently, is commonly of rheumatic origin. The figures on rheumatic heart disease fall below the true level since most reports recorded only valvular disease without indicating its rheumatic origin.

During wartime the rejection rate for rheumatic heart disease is revealed as 340 per 100,000 registrants examined, representing 11 per cent of the total cardiovascular rejections. These figures are based on the defects listed as the principal causes for rejection. It is obvious that some registrants with rheumatic heart disease were rejected because of some unrelated defect which was judged more serious.

In the teen-age group the prevalence rate for cardiovascular disease is of unusual interest. Figures based on a sample of 45,585 registrants showed a combined average of 310 per 100,000—330 for whites and 60 for Negroes.

In considering the statistics assembled on cardiovascular rejections, it was the opinion of our Medical Division that functional elements were unduly emphasized, that rejections themselves were unusually

high, and that the rheumatic origin of heart disease was understated. These opinions all find some support in a special cardiovascular survey which was carried out under the auspices of the Subcommittee on Cardiovascular Disease of the National Research Council. This committee consisted of outstanding nationally known cardiologists: Dr. Paul D. White of Boston, Dr. Robert L. Levy of New York, Dr. W. D. Stroud of Philadelphia, Dr. G. K. Fenn of Chicago, and Dr. W. J. Kerr of San Francisco.

In all, some 4,994 rejectees were studied, of whom 2,476 were diagnosed as rheumatic heart disease, or approximately 50 per cent of the total. The previous classification was confirmed in 82.1 per cent of the cases and reclassification effected in only 17.3 per cent of the cases, that is, were changed from 4F to 1A classification and sent forward to the induction station. This survey reveals that rheumatic fever is responsible for approximately 50 per cent of the total cardiovascular disorders which are disqualifying registrants for military service.

Another set of figures unquestionably will be of interest, those having to do with the 4F pool of rejectees. On July 1, 1943, it was estimated that 2,976,000 registrants aged 18 to 37 were in Class 4F; of these 190,500 were so classified because of cardiovascular reasons. Applying the findings of the special committee of the National Research Council to these 190,500 men, it would appear that on July 1, 1943, somewhere in the neighborhood of 95,000 would fall into the rheumatic heart disease group.

You are to be congratulated on all you have accomplished to date. In many places here and there, splendid programs are already in operation with adequate personnel, facilities and finances. But this does not suffice if we are to attain national success. This kind of service must be universally available throughout the country for all the victims of rheumatism and rheumatic heart disease.

There has been recently created a National Council for Rheumatic Fever and Rheumatic Heart Disease. This constitutes a long step forward in the right direction. This council should stimulate extension of all the good programs now in operation, integrate them, and initiate others elsewhere as they are needed. Now we are interested in how to obtain for it adequate support, medically and financially. Strong moral support of the medical profession is essential to proper financing of this great project.

The initiative for progress in this special field rests primarily in two groups: the cardiologists and the pediatricians. Yours is the responsibility of planning a national movement and getting it under way. The greatest needs, as I see them, are for (1) more and more research on the cause, prevention, incidence, care and cure of acute rheumatic fever and rheumatic heart disease; (2) more adequate dissemination of pertinent information to all who can use it advantageously; (3) more successful conversion of scientific knowledge into clinical practice; (4)

a national campaign of education to enlist broader public interest and larger financial support.

*The Need for Cooperation of Pediatricians and Cardiologists in the National Physical Fitness Movement.*—Broadly your problem is really identical with those facing us in our Joint Committee on Physical Fitness. You deal with one of its most important phases. Your problems, as do ours, call for the joint action on the part of many organized groups: the American Medical Association, the American Dental Association, the American Hospital Association, the National Educational Association, the American Association for Health, Physical Fitness, and Recreation, and the United States Public Health Service. But the cooperation of organizations alone will not suffice. Success demands above all else the cooperation of the public, the parents and teachers, and also of the children concerned. In this field of rheumatic heart disease the pediatricians and cardiologists must take the leadership in the fight. We, in general medicine, and in the Joint Committee on Physical Fitness will give you our complete support.

The medical phases of the work on the Joint Committee are centered in the Medical Affiliates Group, under the Chairmanship of Dr. Olin West, Secretary and General Manager of the American Medical Association. The cardiac phases of our program are under the guidance of Dr. William Stroud, well-known cardiologist from Pennsylvania. Your cooperation with Drs. West and Stroud will bring you the support of the Joint Committee. We medical men must work together in the National Physical Fitness Movement. You can contribute much to the success of the broad Program of Physical Fitness because you are best qualified to deal most effectively with one of its major phases. If in medicine we all now unite in a national campaign for the prevention and care of acute rheumatic fever and rheumatic heart disease, as we have in the past in the field of tuberculosis, much can be accomplished for the improvement of the health of the nation.

# A PLAN FOR REHABILITATION FOR RHEUMATIC SUBJECTS

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A RHEUMATIC subject rehabilitation plan has two distinct parts, sometimes interdependent and sometimes entirely distinct. The one part deals with the physical damage caused by the disease, while the other part consists of the patient's mental reaction to the disease. No program that deals only with the physical damage can be considered satisfactory or adequate. A rehabilitation program also presupposes a knowledge of the names of the individuals who may need rehabilitation. For some diseases such as poliomyelitis this is a very easy matter. In the case of rheumatic fever, however, the problem is a more difficult one as individual physicians differ widely in their ability to diagnose this disease and in their use of criteria for this purpose. For example, Rutstein and Parker found in one area in New York State that general practitioners reported an incidence of this disease varying from 0 to 13 per cent in comparable groups of children. Wherever tried "reporting" of this disease by the usual methods has been unsatisfactory, while the "registration" method or the listing of only those cases whose diagnosis have been verified is of value from the standpoint of reliability, but is very apt to be incomplete as far as the community is concerned. The London system is the most successful and most widely known example of this method. Centering a program around a well-organized cardiac clinic has not only the same advantage of careful diagnosis, but also the same disadvantage of incompleteness. In our experience, attendance at such a clinic has varied inversely with the economic state of the community and not with the prevalence of the disease.

There is, however, another approach to this problem that seems to have many advantages over the methods mentioned; namely, the approach through the health services of public schools. I shall list a few of these advantages.

1. Practically all of the children of the community attend public school from the age of 5 or 6 to the age of 14 to 18 years, thus giving a period of eight to thirteen years of continuous observation. In civilian life this age group furnishes the vast majority of cases of rheumatic fever.

2. Because of the routinely repeated physical examinations it is possible to detect cardiac lesions regardless of whether they have, or have

From the School Health Services of the Public and Parochial Schools.
Read at the Annual Meeting of the American Academy of Pediatrics, Nov. 9, 1944, St. Louis, Mo.
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not, been preceded by symptomatic rheumatic infections. There is also the opportunity to correct erroneous diagnoses previously made.

3. Schools are ideal for providing vocational guidance to those children with physical handicaps and for providing corrective measures for those who have developed mental handicaps because of rheumatic fever.

4. The School Health Service provides an excellent way to disseminate the best scientific information available about rheumatic fever and its many problems; directly to school physicians and indirectly to other physicians in the community.

5. The schools also furnish an excellent outlet for publicizing many aspects of the disease to nurses, teachers, mothers, and the laity generally through the many clubs and associations now centered around the schools. It is especially valuable to explain to these groups the rheumatic fever program and to emphasize that many children who have rheumatic fever do not develop clinical heart disease and that many more develop only slight heart lesions and therefore need little or no restriction of their activities.

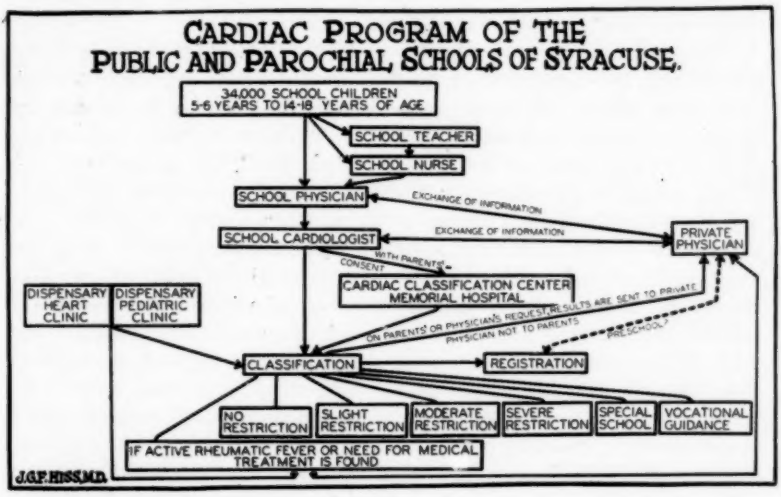


Chart I.

In addition there may be two other advantages: first, statistics derived from studying such a sample of the population may have tremendous research value; and second, the schools may possibly aid in carrying on a chemotherapeutic prophylaxis program if and when the physicians of a community feel that such a program should be instituted.

This method of approaching the rheumatic fever problem through the School Health Service is being used in Syracuse, N. Y., a city of 225,000 people. There are two school systems; the public school sys-

tem with about 27,000 pupils in forty-seven grade and high schools; and the parochial school system with about 7,000 pupils in sixteen grade and high schools or about 34,000 pupils in the combined school systems. The public school system has its own health service, while the parochial schools receive their health service directly from the Department of Health. These two services, however, are headed by a common full-time physician as director. The larger system has in addition thirteen part-time school physicians while the smaller system has three part-time physicians or approximately one physician for each 2,000 pupils in the combined systems. Several of these physicians are well-trained young pediatricians, while the others are general practitioners, some with many years' service as school physicians, and some who are merely temporary appointees during the war emergency to replace men in active military service. There are, also, at the present time, one orthopedist, one ophthalmologist, one psychiatrist, two dentists, and one cardiologist all on a part-time or consultant basis. There is in the public school system one well-equipped special school to which any handicapped child may be sent. It also takes care of the normal children from its immediate neighborhood. (Chart I.)

In compliance with the regulations of the State of New York school physicians try to examine every child once a year. Children who are frequently absent or appear to be below par are examined more frequently. Parents or guardians are invited to be present at the examination, but less than 5 per cent accepted this invitation last year, although an equal number later conferred with the examiner concerning defects found. When a school physician has finished examining the children in a school he arranges to have the cardiologist meet him at this school and together they re-examine all the children in whom he has found any cardiac abnormalities or who have a history of any disease which might produce a cardiac lesion such as rheumatic fever, scarlet fever, chorea, or repeated sore throats, or who have signs or symptoms that could indicate an active rheumatic process, such as leg pains, nose bleeds, slight fever, twitching, skin nodules or rashes, tachycardia, anemia. Siblings of rheumatic subjects are also frequently included. The school nurse is always present and she is usually able to give a great deal of information about the child's home conditions, his parents, his siblings, and the name of his usual family medical adviser. At the present time the parents are not being invited to this examination for two reasons: First, I feel strongly that the properly trained school physician of the future will make all the special examinations that occur with any degree of numerical frequency including orthopedic, eye, ear, heart, lung, and other examinations and, therefore, parents should not be taught to feel that only "specialists" or "consultants" can make these examinations. If as a result of this examination it is necessary to confer with the parents the school physician should be the one to do so. The second reason for not inviting the parents is to

avoid possible friction with the family physician. He might object to having a cardiologist discuss his patient's condition and prognosis with the child's parents; whereas, he would not object to a statement by the school physician to the parents that the child should be taken to his private physician for examination or treatment.

In this re-examination by the school physician and the cardiologist the findings are arranged in four categories:

1. Signs that might indicate rheumatic activity
2. History that might indicate etiological factor of heart findings or the reason for asking the cardiologist to see the child
3. The cardiac findings
4. The recommendations regarding physical activities and education and vocational guidance

The terms used are those recommended in, "Nomenclature and Criteria for Diagnosis of Disease of the Heart," by the New York Heart Association, modified slightly to fit our particular needs. Numbers are given to each finding so that at some later date nonmedical clerical assistants can be used in tabulating and analyzing our results. The form and code used by the school physician are given in Table I.

For example, 0-134-15-2 indicates that the child has no signs of rheumatic activity at the time of examination, but that he does have a history of rheumatic fever, chorea, and scarlet fever; that he has a mitral systolic murmur which is transmitted to the left of the heart border and an aortic diastolic murmur, without cardiac enlargement; and that the child's gymnastics should be restricted to the milder types. The cardiologist uses the same numbers but adds after most of the digits a letter indicating the degree of involvement or a subclassification of the term used. If the clinical examination alone does not furnish all the information desired, the pupil is referred to the cardiac classification center in the Syracuse Memorial Hospital. This center or clinic is being equipped with a fluoroscope, electrocardiograph, and laboratory facilities through the generosity of the Syracuse Post of the American Legion. If the re-examination or consultation ends with the opinion that the child's activities need not be restricted (and this is by far the most common recommendation) no notice is sent to the parents. Why run the risk of causing an "anxiety reaction" in the parents with possible unfavorable secondary effects on the child? If, however, it is felt that a child not already restricted needs restriction or vice versa, or if the findings suggest rheumatic activity, one of two courses can be followed. If the child's private physician is known, he is contacted by the school physician, or more usually by the cardiologist, and told of the findings so that he may contact the patient's parents and discuss the matter. This approach preserves the private physician-private patient relationship and makes the physician more willing to cooperate with the School Health Service. Already several private physicians

have reversed the process and have contacted the cardiologist to tell him of their patient. This can be of tremendous help, especially in the case of a child who has recently had rheumatic fever. If, on the other hand, the child has no medical adviser, then the parents themselves are told that the child has some abnormality that needs investigation or treatment.

TABLE I

| | |
|---|---|
| | *A. Rheumatic Activity Index* |
| 0 | No evidence of activity |
| 0 | Used with any of the following activity symbols to indicate that even though there are some signs that sometimes indicate rheumatic activity the examiner believes that in this case no such activity is present (e.g., 01 indicates that there is fever present but the examiner feels that it is not due to rheumatic activity) |
| 1 | Fever |
| 2 | Joint pains |
| 3 | Skin signs |
| 4 | Chorea |
| 5 | Blood changes |
| 6 | Clinical carditis |
| 7 | Radiological and electrocardiographic changes |
| 8 | Congestive heart failure |
| 9 | Other signs |
| | *B. History Index* |
| 0 | No relevant history |
| 1 | Definite rheumatic fever history |
| 2 | Possible rheumatic fever |
| 3 | Chorea |
| 4 | Scarlet fever |
| 5 | Repeated tonsillitis |
| 6 | "Contact" or "Inheritance" "Other cases in the family" |
| 7 | Carditis or heart findings on routine examination |
| 8 | Presence of heart lesion from birth ("Congenital") |
| 9 | Other pertinent history |
| | *C. Cardiac Findings Index* |
| 0 | No abnormalities |
| 1 | Systolic murmur heard best in the mitral area and transmitted to the left or down beyond heart border; this murmur usually "organic" |
| 2 | Systolic murmur heard best in mitral area but not transmitted beyond cardiac border; this murmur usually "accidental" but may be "organic" |
| 3 | Systolic murmur heard best in the mitral area and transmitted to the base; this murmur nearly always "accidental" |
| 4 | Murmur of mitral stenosis |
| 5 | Murmur of aortic insufficiency |
| 6 | Murmur or aortic stenosis |
| 7 | Cardiac enlargement |
| 8 | Rhythm disturbances |
| 9 | Other findings including congenital lesions |
| | *D. Recommendations* |
| 0 | No restrictions of any kind |
| 1 | Allow all gymnastics but not competitive athletics |
| 2 | Mild gymnastics only |
| 3 | No physical exercises |
| 4 | Rest periods in school, restriction of recess activities; open air class if available in the school |
| 5 | Percy Hughes School (school for the handicapped) |
| 6 | Parents to be asked to furnish transportation to and from school |
| 7 | Home teacher |
| 8 | Convalescent home |
| 9 | Special recommendations |

Generally, children are not restricted if they have merely a tachycardia or a soft blowing mitral murmur even if considered organic if there is no cardiac enlargement or history of recent rheumatic activity. Children with other murmurs but without enlargements are only slightly restricted. Frequently only permission to engage in competitive interscholastic athletics is denied. When there is slight enlargement the child is excused from strenuous gymnastics, and when there is marked enlargement he is excused from all physical activities. Most children are kept in regular classes in their nearest school. However, some pupils are sent to the school for handicapped children and are furnished transportation by the school bus. There are no classes exclusively for "cardiacs." Each transfer to this school is considered under its own merits. Most common reasons for admission to the special school are:

1. Recent rheumatic activity with or without heart damage. Transfer of a child of this group frequently is determined by the distance of the child's home to the regular school, to the nature of the intervening terrain, and to the inability to obtain transportation to the regular school if the distance is great.

2. "Invalid reaction" or "inferiority complex." Paradoxically many children sent to this special school have no organic heart disease at all or have organic disease that requires no restrictions, but these children are suffering from an "invalid reaction" or "inferiority complex" brought on by overrestriction by the parents because of overanxiety or misinformation. These children are either not restricted at any time in this school or the restrictions are removed in stages depending upon the severity of the mental reaction. Incidentally I feel that this is the most valuable use of a well-run special school in the treatment of children with cardiac conditions, real or imaginary.

3. Inability of a small group of severe cardiac patients to go to school because of physical reasons, chiefly distance from school, hills, or the presence of many stairs in the school building.

Every effort is made to return the first two groups to their regular schools as soon as possible, usually at the end of one or two years. The unfortunate results of segregation for long periods of time of children with no lesions or with minimal lesions are known to most of us. If it is felt that a child's cardiac condition is such that there should be some permanent degree of restriction of activities, his name is given to the teacher in charge of vocational guidance. He then tries to direct the child into some line of endeavor compatible with his physical condition. Several local factories have agreed to employ rheumatic heart disease subjects for some jobs. In addition there are many jobs outside of factories that are suitable for persons with some degree of heart impairment.

Time does not permit a discussion of plans for the study and care of preschool children or older children and young adults who have finished school, but it should not be difficult to coordinate their guidance with the program described. (Chart II.)

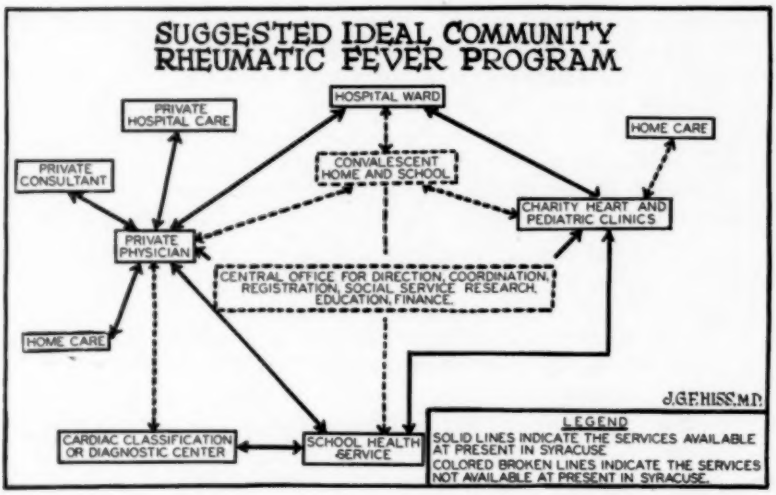
SUGGESTED IDEAL COMMUNITY
RHEUMATIC FEVER PROGRAM
HOSPITAL WARD
PRIVATE HOSPITAL CARE
HOME CARE
PRIVATE CONSULTANT
CONVALESCENT HOME AND SCHOOL
CHARITY HEART AND PEDIATRIC CLINICS
PRIVATE PHYSICIAN
CENTRAL OFFICE FOR DIRECTION, COORDINATION, REGISTRATION, SOCIAL SERVICE RESEARCH, EDUCATION, FINANCE.
HOME CARE
J.G.E.HISS.M.D.
LEGEND
SOLID LINES INDICATE THE SERVICES AVAILABLE AT PRESENT IN SYRACUSE.
COLORED BROKEN LINES INDICATE THE SERVICES NOT AVAILABLE AT PRESENT IN SYRACUSE.
CARDIAC CLASSIFICATION OR DIAGNOSTIC CENTER
SCHOOL HEALTH SERVICE

Chart II.

In conclusion it may be stated that the School Health Service of our public schools presents an unusual opportunity to attack the rheumatic fever problem, by case finding, registration, and rehabilitation, both mental and physical, as well as contributing to the enlightenment of physicians, nurses, teachers, and the general public in many phases of this tremendous problem. The term cardiologist has been used throughout this presentation, but this plan should work equally well under the guidance of a pediatrician interested in cardiology or a cardiologist interested in rheumatic fever, or preferably the two working together. In this connection I must take this opportunity to gratefully acknowledge the valuable assistance I have received from the pediatricians of my own community. Finally, may I suggest that every member of this Academy of Pediatrics seriously explore the possibility of cooperating with the School Health Service of his community in attacking this most important disease of childhood.

# MOBILIZATION AGAINST RHEUMATIC FEVER

GEORGE M. WHEATLEY, M.D., M.P.H.*
NEW YORK, N. Y.

ORGANIZED effort is as necessary in the fight against disease as it is to the winning of war. The greatest improvement in mortality and morbidity has occurred when community forces under medical leadership have warred against a specific health problem. The conquest of tuberculosis is a good illustration of what can be accomplished by such organized effort. Conceived and led by physicians, the anti-tuberculosis movement has been a major factor in reducing the mortality from tuberculosis by 75 per cent in the forty years since it was initiated.

Even more spectacular has been the saving in the lives of children since pediatricians have led the child health movement. Deaths due to the communicable diseases of childhood have decreased 90 per cent, and infant mortality has been cut by nearly 60 per cent in the last twenty-five years. These rapid gains reflect the speed with which knowledge of child hygiene has been put into practice. It has been said that medical practice lags twenty years behind medical knowledge. This can hardly be said of child health. But it hasn't been done by physicians singlehanded. This record of success is due to many agencies understanding the problems and helping in their solution. Medical leadership, however, interpreted, inspired, and guided their efforts.

## THE IMPORTANCE OF RHEUMATIC FEVER

These same qualities of wisdom, public spirit, and energy are needed in organizing the fight against rheumatic fever. This is the No. 1 unsolved pediatric problem. As deaths from other diseases in young people have decreased year by year, rheumatic fever has emerged as the most important cause of mortality in the ages 5 to 24. In the age group 5 to 19, it is the leading cause of death, and in the group 20 to 24, it is exceeded only by tuberculosis. (See Charts I, II, and III.)

Mortality is not the only measure of its importance. About 1 per cent of school children in the United States probably have some degree of rheumatic heart disease. For some localities I believe this is a very conservative estimate. Rheumatic heart disease is the most frequent cardiovascular defect among selectees recorded by the Selec-

Read at the Annual Meeting of the American Academy of Pediatrics, Nov. 9, 1944, St. Louis, Mo.

*Assistant Medical Director Metropolitan Life Insurance Company.

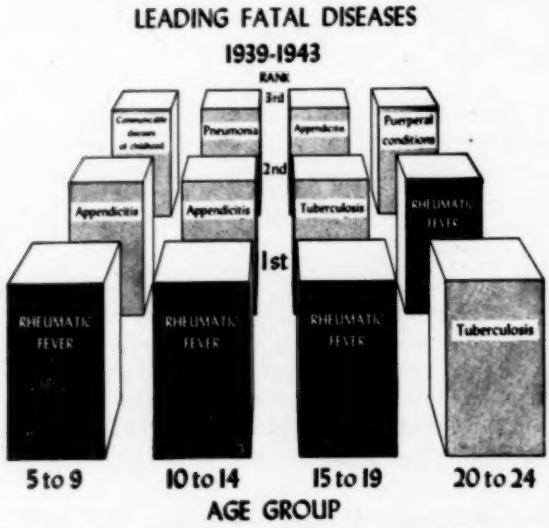


Chart I.—Rheumatic fever ranks high as a cause of death in young people (Metropolitan Life Insurance Company).

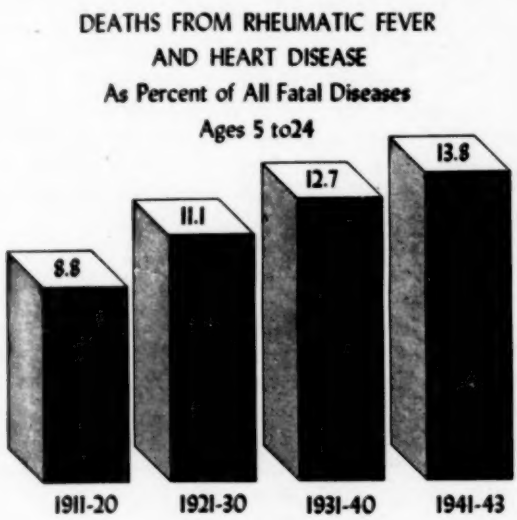


Chart II.—Rheumatic fever causes an increasing proportion of the total mortality among the children.

tive Service System. It has been estimated that 2 per cent of the first 2,000,000 examined were unqualified because of rheumatic heart disease. And now, as if to prod us into action, the disease has developed in near-epidemic proportions in certain localities of the country among our young military personnel.

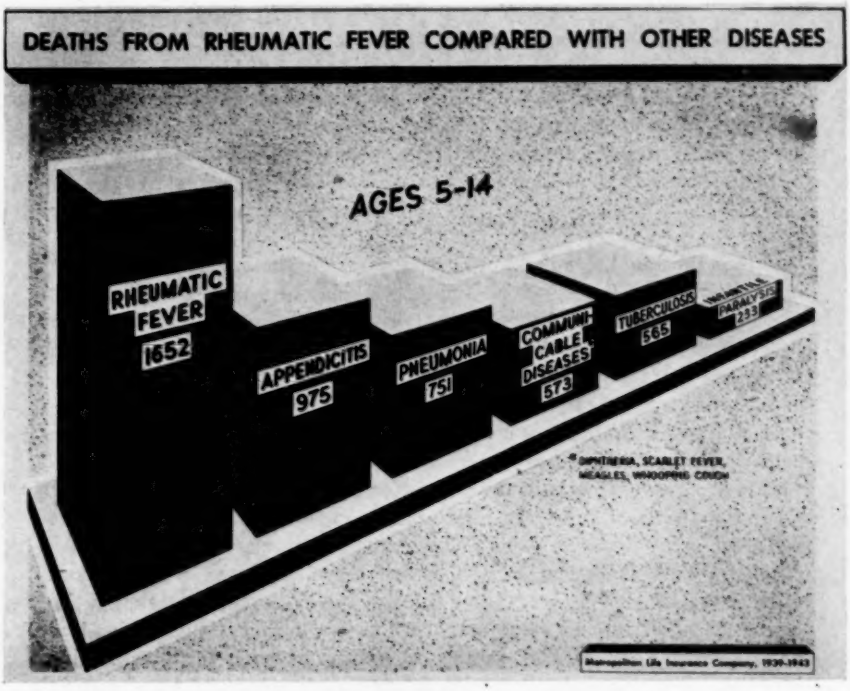


Chart III.

## NOW IS THE TIME FOR ACTION

The solution—even the approach—is more obscure and complex than any other child health problem we have faced. We do not know its cause; we haven't a diagnostic test; and we have no specific therapy. These barriers must be cleared if we are to win control over the disease and prevent it with the same assurance as we now do smallpox and diphtheria. We should not let our ignorance immobilize us while we wait for a specific preventive to come out of the laboratory. Many would have died of tuberculosis if we were still waiting for a specific preventive measure to be discovered before beginning an organized movement to eliminate tuberculosis. At the turn of the century infant mortality was an obscure, complex, and enormous problem. Now we have the solution. I believe the time has come to do more about rheumatic fever than we have done to date. The cardiologist

and the internist, of course, have a great interest in this problem. But it begins in the vast majority of cases in childhood; it is the most frequent cause of death due to disease in children. Such active measures as are now possible should begin in childhood. In spite of the fact that every physician is overburdened at the moment, this is the time to make postwar plans for a full-scale attack and to initiate immediately certain steps which are feasible.

One of the reasons for organization is to secure public support. The public should be told of the need for funds for research; of the need for, and the cost of, special facilities for long-term medical care and supervision; and of the need in many cases of rehabilitation and vocational guidance.

### WHAT ORGANIZED EFFORT NOW EXISTS?

In conducting the educational campaign on rheumatic fever of the Metropolitan Life Insurance Company during the past several years, we have learned that there are individuals and groups already active in an organized way and interested in and ready to cooperate in a national effort. There are the State rheumatic fever programs which are financed by the Social Security funds administered by the Children's Bureau. There are eleven heart associations throughout the country: six of these are city associations, four are State, and one is regional. There are six heart committees of medical societies: four of these are in cities and counties, and two in State associations. Eight State tuberculosis associations have heart programs, and ten city and county tuberculosis and public health associations have heart committees of the 500 local tuberculosis associations throughout the country. Judging by the response to communications which we have sent to them, these are the organizations with the most active interest. For example, response from the directors of programs in States with a Children's Bureau rheumatic fever program has been almost 100 per cent. Heart associations and State medical societies are grouped next. We have also had a very good response from deans of medical schools and heads of departments of pediatrics.

### MEDICAL INTEREST IN RHEUMATIC FEVER

There appears to be a keen and growing interest in the disease among the medical profession. Several State medical societies have made State-wide distribution of rheumatic fever literature and organized special educational programs. The handbook, *Rheumatic Fever in Children,* has been very popular. Agents of the Company personally delivered about 40,000 copies to individual physicians. We have supplied thousands more on request to physicians in military service and to public health nurses. About 100,000 copies have been distributed to date, and the booklet is in its third printing. The second edition of *The Epidemiology of Rheumatic Fever and Some of Its Public Health*

*Aspects* by Dr. John R. Paul and other contributors, printed by the Company for the American Heart Association, is now out of print. There has been a big demand for this publication from the medical departments of both the Army and Navy. To meet these and other requests the publication will be reprinted in 1945. At the 1944 American Medical Association meeting in Chicago last June, a series of informal consultation sessions, conducted by leading authorities on rheumatic fever, was one of the most popular activities of the entire convention. These conferences were conducted three or four times a day all four days of the meeting. The room was packed and discussion was very lively. Questions asked repeatedly by different groups were: how long to keep the patient in bed; the value of tonsillectomy; the use of salicylates and sulfonamides.

### PUBLIC INTEREST IN RHEUMATIC FEVER

The public wants to know more about rheumatic fever. The two booklets published by the Company, called *About Rheumatic Fever,* and the latest one, *What About Rheumatic Fever?,* we estimate have been placed by agents of the Company in about a million and a half homes. Through physicians, nurses, heart associations, over 2,800,000 of these leaflets have been distributed. Many of the Company's agents aided not only by distributing literature but by helping organize meetings of lay groups and by securing newspaper publicity in their localities. Our national advertisements have resulted in thousands of requests for the leaflets and hundreds of letters asking for more information. The last advertisement, which appeared in February, 1944, called "The Doctor Talks to Mrs. Roberts About Rheumatic Fever," has been among the best read Company advertisements in recent years.

There are some who are critical of efforts to inform the public about rheumatic fever. The following illustration, I think, shows what can happen when the public is not informed. Two years ago one of the country's few and very best centers for rheumatic fever children was threatened with closing because the city fathers who supported the institution were more impressed with the publicity for the Kenny treatment for infantile paralysis and were then preparing to divert funds from the care of children with rheumatic fever to those with infantile paralysis. Fortunately sufficient influence was brought to bear in time to avert the threat.

### NEW EDUCATIONAL MATERIAL

The Company's new educational material for medical groups includes the statistical exhibit, "Rheumatic Fever in Young People," which has been used at more than thirty professional meetings since it was first shown in June at the American Medical Association eight months ago. Now available is a new booklet, called *Studies in Rheumatic Fever,* with black-and-white reproductions of these charts. These charts

are also on Kodachrome slides, both 35-mm. and standard lantern slides, to illustrate talks to medical groups. For the public, the new material consists of a sound film-strip called "Jimmy Beats Rheumatic Fever."

### WHAT NEEDS TO BE DONE NEXT?

What does all this activity, both local and national, mean? It means that there is currently a high tide of interest in rheumatic fever; that there are, in many parts of the country, agencies and individuals to assist in a full-scale attack. What is urgently needed is a national group which can give guidance, stimulation, and other assistance to these individuals and agencies. This does not call for a completely independent new organization. The trend in the voluntary health movement is away from the development of independent health organizations. What is needed is a coordinating, integrating body to unite the various interests. What might be the objectives and what might be some of the activities of such a national body? They might come under four general headings:

1. The application of standards for diagnosis and care
2. The promotion of facilities for care
3. The stimulation, coordination, and financing of studies of the disease
4. The development of programs of professional and public health education

There is need for a national group to formulate and foster standards of diagnosis of rheumatic fever and rheumatic heart disease. Jones recently proposed such standards for rheumatic fever,[1] while the New York Heart Association has formulated standards for rheumatic heart disease.[2] One of the activities of a national body might be to encourage the use of these standards in general medical practice, the school medical examination, industrial medical service, in insurance examinations, and elsewhere. Involved in this problem of diagnosis is accurate reporting and registration of cases of the disease. There is need, too, for the development of standards of operation for outpatient clinics and diagnostic centers, as well as the formulation of standards of care for patients. Involved in the study and promotion of facilities for care would be an up-to-date survey and evaluation of the facilities for care and preparation of adequate plans of rehabilitation and vocational guidance. Experimentation with methods of providing complete care and supervision, perhaps modeled on the London County Council Scheme or adaptations of this plan could be encouraged. Professional education might involve the organization of national and regional symposia; influencing undergraduate and postgraduate medical instruction; and publication of scientific articles, manuals, and exhibits for professional meetings.

In the field of research there are innumerable problems which make the horizon almost limitless. This makes it difficult to stake off and

thoroughly till any one field. The etiological factors at this time appear to be so numerous and complicated that they call for the cooperation of the pathologist, the epidemiologist, the physiological chemist, the bacteriologist, and the clinician. A national group might agree as to the most fertile sections and with funds encourage investigators to work in these areas and help coordinate their research efforts. And finally, the field of public education—functions which would include the issuance or sponsorship of literature for national distribution and review of publications for local groups; the stimulation—both nationally and locally—through other publicity media; and an information service.

### THE NATIONAL RHEUMATIC FEVER COUNCIL

There are signs that the ranks are forming for the attack. In December, 1943, representatives of professional agencies with an active or potential interest in rheumatic fever were called together by the American Heart Association to discuss organized action against the disease. This group declared itself in favor of the formation of a National Rheumatic Fever Council which would foster the extension of public programs of care and secure aid for special studies of rheumatic fever and to promote public and professional education. During the past year, under the untiring leadership of Dr. H. M. Marvin, some progress has been made in securing funds for its establishment and invitations have gone to professional bodies to name delegates to the Council. Among the professional organizations which have appointed representatives are the American Medical Association, the American Academy of Pediatrics, the American Heart Association, and the American Public Health Association. Drs. Hugh McCulloch and Alexander Martin are the Academy's representatives. A second meeting was held in December, 1944, at which time the Council was officially established. Now, for the first time, we have a general headquarters for the fight against rheumatic fever.

### THE NEED FOR MEDICAL LEADERSHIP AND SUPPORT

The effectiveness of the new Council will depend not only on the care with which it studies the many problems which await it, and on the quality of its organization on a national level, but upon the support which it engenders and secures from State and local groups. To give effective national leadership, it must work with and have the support of individuals and groups already at work on the various aspects of the problem in States, cities, and regions. A way to develop such local channels would be for the National Council to help groups in a State to form a State Rheumatic Fever Council. In larger cities, such as New York, Chicago, Philadelphia, Boston, where there are agencies and individuals actively or potentially interested in the problem, these groups should be encouraged to work together, perhaps in a city council. In localities where there already exists at least one

organized group interested in the problem, such as a heart association, this agency can take the initiative for bringing together representatives of other groups. Where no formal rheumatic fever group now exists, the initiative may come from the Tuberculosis and Health Association, the Medical Society, the State Chairman of the Academy, the Council of Social Agencies, or an interested physician. Most important in bringing about such a local organization is medical leadership. The physician is the one most likely to appreciate the importance of rheumatic fever—particularly a pediatrician who knows the value of organized effort in attacking disease. We have inquired of many of the organized groups now working in rheumatic fever how their program came into being. Typical is this comment about the development of a rheumatic fever program in a Connecticut city.

"We have much to be thankful for—chiefly in the calibre of the people who planned the organization—the doctor, the president, and the executive board. They were convinced of the need and set out to conquer all obstacles.

"It seems that a few key people must be ready before the plan will 'take'—the vitalizing energy must come from within and the doctor is the person from whom the original plans must come."

## SUMMARY

Public-spirited physicians or groups of physicians have led and supported the successful public health movements. Now rheumatic fever has come into the foreground as our most serious unsolved pediatric problem. Action is needed to bring to bear more resources for study, care, and education. Because of the occurrence of rheumatic fever in the Armed Forces and the efforts already made to inform the public, there is at present an active interest in the disease. A National Rheumatic Fever Council has been formed for united action. Its opportunities are great. But most of all, the active support of every pediatrician is needed so that rheumatic fever can be attacked with the same vigor, vision, and organized effort which has characterized the action of American medicine against tuberculosis, infant mortality, and the childhood diseases once formidable in our country.

## REFERENCES

1. Jones, T. Duckett: J. A. M. A. 126: 481, 1944.
2. The Classification of Patients With Diseases of the Heart, New York Heart Association. March 1943 edition.

# GENERAL STATEMENT REGARDING STATE RHEUMATIC FEVER PROGRAMS

BETTY HUSE, M.D.*
WASHINGTON, D. C.

TO REPORT to the pediatricians of this country concerning the development of services for children with rheumatic fever, under the Social Security Act, is not only a pleasure, but also an obligation. For, more than any other group, you have been responsible for making these services possible as they now exist, and you will be responsible for improving and extending these services until they actually meet the needs of children in this country.

Your responsibility has been threefold. First, as professional men and women, you have seen and pointed out the need for services for children with rheumatic fever. You have found these needs in your private practice and in your clinic practice, and as an organized group you recommended, in a regional meeting of the American Academy of Pediatrics in Rochester, N. Y., November, 1938, that heart disease should be considered a crippling condition so that children with rheumatic fever and heart disease might be eligible for services under State programs for crippled children.

Second, you have taught the public what rheumatic fever is and what constitutes good care for a child with rheumatic fever. By demonstrating to people the kind of excellent care that children should have you have played a most important part in mobilizing public demand for that kind of care for all children.

When, because of the demands of your own professional group and of the public, the development of State programs of service to children with rheumatic fever became possible, you have assumed your third type of responsibility, namely, the implementing of these programs by help and advice in their planning, by the provision of the pediatric services needed, by research and study that will lead to improvement of services.

I should like to tell you something about these programs up to the present time. As you know, the Social Security Act, as passed in 1935, authorized annual appropriation to the Children's Bureau of $2,850,000 Federal funds to be paid as grants-in-aid to States for services for crippled children. In 1939, an additional annual appropriation of $1,020,000 was authorized by Congress and since that time the Children's Bureau

Read at the Annual Meeting of the American Academy of Pediatrics Nov. 9, 1944, St. Louis, Mo.

*Assistant Director for Crippled Children, Division of Health, Children's Bureau, United States Department of Labor.

has set aside some funds each year for the development of State rheumatic fever programs.

As soon as these funds became available, the Chief of the Children's Bureau called together a small committee of pediatricians and other recognized authorities in the field* to discuss general policies for the development of these programs. The recommendations made by this group related both to the scope and to the quality of services to be provided. With these recommendations as a guide, the Children's Bureau consultants began to plan with individual State crippled children's agencies as to inaugurating State rheumatic fever programs.

The first State plan for a rheumatic fever program (Oklahoma's) was approved by the Chief of the Children's Bureau in March, 1940. Today, somewhat over four years later, nineteen States have approved programs for the care of children with rheumatic fever.† In about one-half of these States, the major impetus toward organizing the program came from individual physicians or groups of physicians, and in all these States, the pediatricians have supported the programs wholeheartedly.

The States with rheumatic fever programs are scattered all over the United States, and, as you can well imagine, no State program is exactly like any other State program. Certain policies and principles, however, have been followed in all the States. In order to make as good use as possible of the limited funds available, it was decided that programs should be encouraged only in those States and only in those areas within States where there was a demonstrated need and where it would be possible to organize a program of good and complete care for children with rheumatic fever, including good medical, medical social, and nursing services and facilities for adequate diagnostic, hospital, and sanatorial care and aftercare. Following this principle, therefore, fourteen of the nineteen States serve a limited area—from one to ten counties—and two others, Rhode Island and the District of Columbia, serve their entire areas, which are, of course, small. The other three States, Connecticut, Iowa, and Oklahoma, offer some service on a Statewide basis, but there is concentration of effort around certain local areas where the community resources are particularly favorable.

All of the State rheumatic fever programs offer a complete range of services. Suppose that a child is referred to the State agency because a physician, schoolteacher, public health nurse, welfare worker, or his

*Dr. T. Duckett Jones, Boston, Mass.; Dr. John R. Paul, New Haven, Conn.; Dr. Albert D. Kaiser, Rochester, N. Y.; Dr. Clifford G. Grulee, Evanston, Ill.; Dr. Henry F. Helmholz, Rochester, Minn.

Members of the Subcommittee on Rheumatic Fever of the Children's Bureau Advisory Committee for Crippled Children's Services are Dr. Hugh McCulloch, St. Louis, Mo.; Dr. Stanley Gibson, Chicago, Ill.; Dr. T. Duckett Jones, Boston, Mass.; Dr. Louise F. Galvin, Richmond, Va.; Dr. H. M. Marvin, New York, N. Y.; and Dr. Alexander T. Martin, New York, N. Y.

†California, Connecticut, District of Columbia, Idaho, Iowa, Maine, Maryland, Michigan, Minnesota, Missouri, Montana, Nebraska, Oklahoma, Rhode Island, South Carolina, Utah, Virginia, Washington, and Wisconsin.

family suspects that he may have rheumatic fever or heart disease. What happens to him? First comes the diagnosis. Diagnostic services are provided at clinics, or the pediatrician may go to the home if the child is sick in bed. Sometimes when a child must be studied further before a diagnosis can be made, he may be kept in the hospital for a few days for close observation.

If it is decided that the child has had no rheumatic fever or heart disease, he is usually seen once or twice more in the clinic, not only to confirm the diagnosis, but also to make sure that the child and his family are actually free of any apprehension. The medical social worker and the public health nurse, in their contacts with the family, are very helpful in assisting the family to rid itself of any lingering fears.

If, on the other hand, the child appears to have rheumatic fever or heart disease, a decision is made as to whether the child may receive services under the State program. The child who is accepted receives whatever type of care he needs. If he is acutely ill, he will be given care in a hospital. When he needs prolonged rest in bed, the State agency provides the necessary medical, social, and nursing care, either in a sanatorium, a sanatorial ward of a hospital, a foster home, or his own home. When he has recovered from his attack of rheumatic fever and is back in his own home, he receives the continuing supervision so essential in the prevention of recurrences. This continuing supervision includes not only periodic medical examinations, but also public health nursing help in improving the health conditions of his home and medical social help in meeting any social or emotional difficulties that might interfere with his care.

Many persons, institutions, and agencies may be concerned in one or another aspect of the child's care. It is the job of the State agency to make sure that a coordinated plan is being followed in every aspect of the child's care and to prevent interrupted and contradictory types of treatment. Thus a close relationship is established with the child's family physician, if he has one, with the local public health officer, public health nurse, and welfare worker, with the schoolteacher, school physician, and school nurse, and with other interested individuals and agencies in order that there may be mutual exchange of information and consultation concerning the child. The State agency also works with public and private agencies to secure types of care needed by many or all the children under this program—education for the homebound child, vocational guidance and training for the child with handicapping heart disease, better housing, increased welfare budgets.

I have given you some idea as to the scope of services available under these State rheumatic fever programs. Now as to the quality of services.

The direction of the program is in the hands of a pediatrician in seventeen out of the nineteen approved State plans, and in the other

two there is joint direction by a pediatrician and a cardiologist. In addition, twelve of the States have formal advisory committees that include pediatricians, and in the other States pediatricians are consulted informally for advice as to the programs.

All the nineteen States have set high standards for the selection of medical, medical social and public health nursing personnel. You would be particularly interested, I believe, in the qualifications of the pediatricians who are providing services under these programs. These pediatricians, in every case, are certified or eligible for certification by the American Board of Pediatrics. In eleven States, these pediatricians have teaching connections with the pediatric department of a medical school (in five of the other States with rheumatic fever programs there is no medical school in the State). Since the beginning of the programs, ten of the pediatricians have taken some special postgraduate training in the field of rheumatic fever. We are extremely proud of the high caliber of pediatric services that are being made available to children under the State rheumatic fever programs.

As to the facilities used in the programs, hospital care is provided in all cases in pediatric departments of hospitals that meet the standards set up by the State agencies. Long-term care is provided in sanatorial wards of hospitals or convalescent homes that meet the standards set up by the Children's Bureau Advisory Committee in regard to medical, nursing, social, and nutritional supervision, isolation facilities, and provisions for recreation. Schooling is provided, usually by the local education authority, to the children in all but three or four of these institutions. Foster homes are selected jointly by a child-placing agency and the medical social consultant so that both the basic needs of the child and his special needs that result from his medical condition can be met. The clinics are held at regular intervals—from twice a week to once a month—at places where there is access to all necessary laboratory facilities; the clinics are small and children are seen on appointment.

I have reviewed for you the scope and quality of services provided under the State rheumatic fever programs. Now, to what extent are these programs meeting the needs of children with rheumatic fever in this country? The over-all needs have scarcely been touched. Some services for this group of children are now available under State programs in only 240 counties of the total 3,082 counties of the United States and its possessions, and even in these 240 counties, services are not available to all the children who need them because of lack of sufficient professional personnel, sufficient facilities, or sufficient funds. It is quite clear that the nationwide needs of children with rheumatic fever are not at present being met.

The State rheumatic fever programs have fulfilled their function; they have demonstrated needs and explored ways of meeting them. The

experience gained with these programs can serve as a basis for sound expansion. On the basis of this experience we know that we must have certain things: We must have more well-trained professional personnel; we must have more hospital and sanatorial facilities adequately staffed and equipped to give good care to these children; we must have many agencies, public and private, working in harmony on a coordinated plan; we must have a public well informed as to the needs of children with rheumatic fever and as to how these needs can be met; we must have more funds, State and Federal.

The Children's Bureau believes that the way must be found to see to it that services are made available to all the children with rheumatic fever or heart disease in the country.

# THE RHEUMATIC FEVER PROGRAM IN MINNESOTA

PAUL F. DWAN, M.D.
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SINCE March, 1942, Minnesota has participated in the work of the rheumatic fever program of the Children's Bureau for Crippled Children. Our territory has been limited to six rural counties, where it was felt that no suitable facilities existed. Our experience has been very gratifying, and the reaction of the medical profession has been one of extreme friendliness and cooperation. The latter situation is due, in a large part I feel, to our insistence that all cases be referred by a private physician or by a local health officer, and that the private physician has been kept in close contact with the case by frequent letters and personal conversations.

We have followed the policy that we are peculiarly fitted to aid the child, the family, and the physician in the management of the acute and convalescent stages of the disease, and have sought the cooperation of the private physician when the quiescent stage was reached and referred the patient back to his care, standing by to give further aid, as necessary. The system of management has led to a very happy feeling and relationship between ourselves and the private practitioners, and we have received numerous requests from physicians from outlying counties to enlarge our program, so that their patients will receive this aid.

We have drawn several conclusions from our period of activity, especially regarding the purpose of rheumatic fever programs, and about the future plans for successful management of this disease throughout the country.

Because of the complex nature of this disease—complex mostly because of the chronicity and tendency to recurrence, and because of the fact that we are dealing with growing children—many ramifications in this matter have to be discussed. We know that we must maintain proper environment for these children, that they must receive the best possible medical aid, and that their education must be maintained during the convalescent period of their illness. The magnitude of this problem, in my mind, places it beyond the scope of any agency, whether governmental or private. I see before me pediatricians who should be able to act as consultants in their communities for the management of this disease. Situated as you are—strategically throughout the country—I feel that you can cover the case finding and treatment of rheumatic fever better than any agency, no matter how well organized.

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It is becoming increasingly obvious that some aid must be given to the families of rheumatic children and to the physician who is trying to handle the cases. The disease is difficult to handle in the home because it is almost impossible to maintain discipline and proper bed rest for the duration of time necessary. It may be in this field that governmental or social aid would be of its greatest value. The various rheumatic fever programs which have been set up have proved to be of great value in the communities where they have been established. Most of them have worked on the basis of giving a temporary lift to the situation, and maintain themselves only in a manner of assisting the patient over the period of his acute illness and convalescence, and turning him back to his private physician. I feel that this is as it should be and that there is no need for a complete socialization of rheumatic fever cases, to the extent that the private physician is eliminated from the picture.

Plans proposed whereby the case finding was done by school nurses, county nurses, and social workers, without consultation with the family physician, are wrong. Close observation of school children by the nurse is, of course, necessary, and if the child seems ill he should be referred to his doctor. I do not feel that diagnosis lies in the realm of the nursing profession, and especially when such a diagnosis leads to reference to a special clinic. Surely this is the realm of the family physician. If we, as physicians, have failed in meeting our obligation in guarding the health of our community, it is time we corrected this instead of turning this function over to lay groups. If we have been lax in our recognition of rheumatic fever, we should inform ourselves of the multiplicity of symptoms, and assume our responsibility as guardians of the health of our people.

Some plans for the management of rheumatic fever go so far as not only to care for the child during the attack, but also to follow him continually until he has reached the arbitrary age of 21. Such a plan may have merit in crowded city districts where the financial level of the patients is such that private medical care is out of the question. However, in this broad land of ours, where medical service is on the highest plane in the world, the nationwide adoption of such a plan would be needless, prohibitively expensive, and contrary to the best interests of the patient. It is obvious, however, that governmental and social agencies have a definite role in the management of rheumatic fever. The patient is a child and, as a child, is a growing individual who requires formal education and social training. During the acute stage of his illness, he must have proper medical care; he must be made comfortable, fed properly, and receive the benefit of good nursing care whether he be in a home or hospital. His contact with his doctor must be such that at no time does he suffer neglect, or have any therapeutic measures neglected which might hasten his recovery or save his life. After this comes a period of months when he needs to adjust himself to

his illness, maintain his education, so that he can return to normal life without the handicap of having lost out in school.

The physical setups in the rheumatic fever clinics should be such that attendance of the private physician could be encouraged and could allow a comfortable, quiet discussion of the problems which the individual child presents, without the hurried, noisy atmosphere of the usual outpatient clinic. Such a conference would be of great value to the clinician holding the clinic, because it would aid in his diagnostic ability, and would, of course, be of great educational value to the referring physician, who might need a review and perhaps alteration of his conception of rheumatic fever. Most studies of any disease hammer home to an observer the diagnostic points and criteria, which might not otherwise be so apparent. If the patient is to be hospitalized, the referring physician should be encouraged to follow the case closely, and in this way feel that he is a part of the organization, that his thoughts are respected, and that there is no attempt on the part of any social organization to interfere with his private patients. He will at once realize the truth of the situation, that any institutional aid is given with his sanction and approval, and that his cooperation is necessary in order that we may properly handle the nationwide problem of rheumatic fever.

Cooperation with the referring physician would also result in the examination of siblings, which would lead to the discovery of cases that might otherwise be overlooked. The cooperation of the referring physician should always be secured in this matter, because he is the one who has been looking after the family throughout the life of the children. Studies on sibling examinations have revealed a high incidence of rheumatic fever.

It is felt that, inasmuch as recent surveys have suggested, there may be as many as 460,000 cases of active rheumatic fever in this country at present, that case finding in this problem can best be done by the 200,000 physicians scattered strategically throughout the United States. There are also approximately 2,600 pediatricians spread about the same localities who can act as consultants in matters of diagnosis in this procedure, and also as consultants in the management of this disease. It is becoming increasingly evident that we must all familiarize ourselves with this picture. The efforts of the Metropolitan Life Insurance Company, as outlined by Dr. Wheatley, with the dissemination of pamphlets regarding rheumatic fever, will make it necessary that each physician familiarize himself with this disease, because the parents are going to demand an intelligent answer to their questions. We feel that the high standards of medical practice in this country enable the medical profession to manage this problem, with aid from social agencies wherever this is necessary, but that complete cooperation should, at all times, be maintained.

It is also suggested that for matters of survey, case finding, and sibling examination, that the disease be made reportable in the various states, and that interested parties, whether they be social agencies, interested physicians acting on their own authority, or officials of the public health agencies, take it upon themselves to follow up such reports. The recent recommendations by the committee on rheumatic fever, published by T. Duckett Jones, M.D., on the diagnosis of rheumatic fever, have given us, I feel, a concrete means of clarifying the symptomatology of this disease. They list as major manifestations the common criteria of diagnosis, and as minor manifestations the vague, indefinite findings which sometimes confuse the issue. I would suggest a report card including these facts, along with a brief definition of the disease. The following card might serve as a start for discussion:

RHEUMATIC FEVER CASE REPORT

*Name* *Address* *Age* *Sex*

Duration of Symptoms:

*Definition:* Rheumatic fever is an infectious disease, manifesting itself in all the tissues of the body, with the following *major* and *minor* manifestations:

| | |
|---|---|
| 1. Carditis | ☐ |
| 2. Polyarthritis | ☐ |
| 3. Chorea | ☐ |
| 4. Subcutaneous nodules | ☐ |
| 5. History of previous attacks or existing rheumatic heart disease | ☐ |
| 1. Fever | ☐ |
| 2. Abdominal pain | ☐ |
| 3. Precordial pain | ☐ |
| 4. Rash | ☐ |
| 5. Epistaxis | ☐ |
| 6. Pulmonary findings | ☐ |
| 7. Laboratory evidence of infection | ☐ |

Please check the symptoms presented for purposes of tabulation for diagnostic purposes.

Two or more major manifestations

or

One major and two minor will constitute a definite diagnosis of rheumatic fever; but any number of minors does not justify a positive diagnosis.

Your help in this matter is solicited and deeply appreciated.

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Reporting Physician

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Address

The purposes of any rheumatic fever program are manifold, the chief objectives being: (1) service to a group of children who otherwise would be neglected; (2) education of professional groups as to the prevalence, severity, and seriousness of the problem of rheumatic fever; (3) a survey function in a community, given in such a way as to reveal the incidence of the disease, and the incidence of the disease among siblings; (4) close contact between the referring physician and the program, in such a way that the referring physician has at all times access to the case, as well as the privilege of discussions and recommendations.

The first point entails aid to the patient, family, and physician, in communities where no public facilities or satisfactory private facilities exist for the care of such a chronic illness as rheumatic fever. The financial

burden imposed upon any family by this disease makes private hospital care practically prohibitive. If the average duration of the infectious process is the index for hospitalization, we would have to accept the opinions of the various authorities that this period would be approximately five months, or 150 days. Hospital costs being as they are, this would amount to a per diem of approximately $5, or a cost to the family of $750. This initial cost, besides the necessary follow-up, makes the disease a very expensive one; and, as so often happens, several members of the family are involved, the problem calls for financial aid from the outside. This, I feel, must be accepted as a public health problem, and suitable provisions made for such, realizing at all times that this problem is not one purely of the indigent, or the so-called relief groups, but is one of the American nation as a whole, and consequently should be treated in such a dignified fashion, with no stigma attached to the receipt of such aid.

Recent surveys of the incidence of rheumatic fever have brought out the fact that the disease is much more common than was previously thought; no longer can a private physician state that he has never seen a case of rheumatic fever in private practice. The inference follows that the cases were not recognized as such. Investigations in the South brought this out very strongly, where it was found that in the pediatric population of the hospitals, a comparable incidence of rheumatic heart disease exists between such States as Louisiana and Minnesota. The clinical picture of rheumatic fever, however, is much milder in the South, and the revealing fact has come forth that the practicing physician has failed to recognize rheumatic fever in its mild forms.

In conclusion, we feel that the whole problem of rheumatic fever, being a medical one, should receive the earnest attention of the medical profession, with the cooperation of any social agencies, equipped financially and otherwise to aid in the hospitalization, convalescent care, and management of rheumatic fever.

# THE RHEUMATIC FEVER PROGRAM IN VIRGINIA

LOUISE F. GALVIN, M.D.
RICHMOND, VA.

IN MAY, 1940, the Virginia rheumatic fever program was initiated, being administered under the State Crippled Children's Bureau, and operated on Federal funds. It was developed in accordance with the general policies outlined by the Children's Bureau Advisory Committee. Two years later the program was written up in detail for *The Child*, monthly bulletin.

The same general policies are still being followed and therefore will be reviewed only briefly.

The staff consists of a full-time pediatrician who is the director, a part-time cardiac consultant, a full-time public health nursing consultant and medical social worker. The latter position is now vacant and the Medical College is donating the services of one of its medical social workers one day a week. The medical social worker plays a most vital part in a program such as this and we are trying to fill this vacancy.

A central clinic is held twice a week in the Medical College of Virginia Out-Patient Department. Any patient suspected of rheumatic fever or heart disease up to 21 years of age is eligible for clinic examination. We feel that special consultation services should not be denied the self-supporting family any more than the indigent one, but lay stress upon close contact and cooperation with the attending or family physician whenever there is one. He states on his application form whether he desires the patient seen for consultation only or for complete care. He is sent reports of every clinic visit. He is consulted when institutional care seems advisable and again before the patient is discharged. In the clinic, a detailed history is taken and complete physical examination is done on every patient. This includes x-ray or fluoroscopic examination, electrocardiogram, complete blood work, Wassermann, urinalysis, and tests for Neisserian infection.

Since patients must come to the clinic by private car or public bus in our state, it is felt that the area served cannot comfortably extend beyond a 100-mile radius. We are this year, starting a bimonthly consultative clinic in another part of the State. Funds for special tests here will be provided by a local philanthropic organization. If this plan proves helpful, we hope to set up other centers.

The pediatrician is also available at all times, for consultations in the homes, at the request of any physician.

Hospitalization for the acutely ill is provided at the Medical College where the patient remains under the care of the pediatrician. Because

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of limited funds and in accordance with the policy of the Advisory Committee that it is better to completely service one patient than to scatter inadequate service, hospitalization and convalescent home care are provided only for patients up to 16 years, who live in Richmond where the permanent clinic is located and in the ten surrounding counties where public health nurses are located. This means that every child once accepted for complete care is near enough to this center to be carefully followed and supervised for many years. Also because of limited funds, preference is usually given to cases with a fair prognosis of reasonable rehabilitation and to those with average intelligence.

Following the acute stage of the disease, the patient is transferred to his home for convalescent care or if for some reason this is not suitable, he is admitted to a small convalescent ward connected with a private hospital but supervised by the pediatrician in charge of the program. Here bedside teaching, occupational therapy, sunbaths, and movies are provided.

If the patient remains in his own home, the local public health nurse and a school teacher visit him regularly. In Richmond the school system also provides a visiting occupational therapist.

Our most solid sense of accomplishment comes from the way in which we have been able to utilize and coordinate facilities of public and private agencies. Where funds are so limited and the period of supervision is so long, this seems essential for an adequate program. It is true, also, that the more people who actively engage in working with the rheumatic fever child, the more widely the disease and the program become known. We also feel there must be a coordinated program of care which will reach into every field of the patient's life—home, school, recreation and work, if good results are to be achieved.

We believe illustrations of the methods by which some of these facilities are utilized, will interest you.

The entire rheumatic fever staff holds classes and demonstrations for students in the Schools of Medicine, Nursing, and Social Work at the Medical College of Virginia. The resident on pediatrics, senior medical students, pre- and postgraduate nurses serve in the clinic under close supervision. This opportunity of instructing students, though entailing considerable work, is eagerly accepted since the value of sending out into the field personnel aware of the rheumatic fever problem is obvious.

The Department of Health of the City of Richmond made aware of the need through a city rheumatic fever register has provided a six-bed ward at the City Home for patients not eligible for care under the Crippled Children's Bureau funds. These cases, however, are selected by the clinic pediatrician and remain under her care. It is expected that the number of beds available will increase.

The homebound patients in Richmond receive bedside nursing care by the Instructive Visiting Nurse's Association, a private nursing agency, and those in the counties receive nursing supervision by the county

public health nurses. The Rheumatic Fever consultant nurse holds weekly conferences at the I. V. N. A. headquarters to discuss special problems. Detailed reports go to the visiting nurse following each clinic examination. She in turn sends regular reports to the clinic.

In Richmond when a patient under school age is returned to normal routine and no longer needs bedside nursing, the I. V. N. A. meets in conference with the city public health nurse and formally transfers the case along with a copy of the record. Here the Rheumatic Fever Clinic carries on continuity by conferences and reports as before.

Funds for such purposes as allowing a working mother to stay at home with a sick child or furnishing richer diet for the patient are made available from any one of several community fund or public agencies. Whenever these are used, close contact is maintained between the social worker on the case and the Rheumatic Fever Clinic, and conferences are frequently held.

To date, no funds have been earmarked for foster home care, but the value of such care in certain selected cases is well known. Several child welfare agencies cooperate by providing carefully chosen homes for these and again the social worker works hand in glove with the clinic.

A Nutrition Department sponsored by the Rockefeller Institute and located in the Out-Patient Department, furnishes a nutritionist for every clinic session. She also goes into the home with the visiting nurse whenever indicated. Copies of her diet lists are incorporated in the patient's chart and in clinic reports to teachers and nurses so they can help follow through with her suggestions in the home.

Schooling for the long-term homebound child is one of the most important factors in his care. In Virginia, the State Department of Education pays two-thirds and the local school board, one-third of the expenses of a visiting teacher. These teachers are accredited with the school board and the patients are given regular school credit for their work. In Richmond the number of full-time visiting teachers has doubled during the past year and a visiting occupational therapist has been added. Funds for the latter are provided by the National Crippled Children's Society. In the counties, the work is usually done by a teacher from the regular school after school hours. The program director and nurse meet with Richmond visiting teachers each fall discussing the disease and individual cases. Written reports of patient's condition and orders are sent to teachers following each clinic examination and teachers in turn periodically report to the pediatrician regarding his adjustment and progress. At present the Crippled Children's Bureau orthopedic and rheumatic fever consultant nurses are jointly preparing a leaflet for use by these visiting teachers. This will contain a section for doctor's orders for the individual patient and a section for general orders illustrated by sketches showing proper use of back rest, bed table, lighting, etc., and pointers for detecting fatigue and other signs of trouble.

Children returning to public school continue to be closely followed. Each fall each school principal is sent the names, diagnoses, and orders on each Rheumatic Fever patient in his school known to the clinic. The pediatrician also meets with the medical director and the school nurses at the beginning of the school year reviewing the disease and any special problems and plans. Periodic reports are exchanged by the Rheumatic Fever Staff and the school nurses throughout the term so that the nurse may be currently informed of the physical condition and any change of orders and the clinic may know of the patient's adjustment in school.

In Richmond, inactive rheumatic fever patients follow through with their occupational therapy in a privately endowed occupational therapy workshop. We believe this is a good thing in helping them to realize that the handcrafts done in the hospital or home were not a prescription for sickness only, but provide a good hobby to carry through life.

Selected cases at the age of 16 years are referred to the State Department of Vocational Rehabilitation for consultation and guidance in the selection of a proper occupational objective and wherever indicated, for special vocational training. The Rheumatic Fever Medical Staff confers with this department regarding each case referred.

In conclusion, the aim of the Rheumatic Fever Program in Virginia has been directed toward furnishing a complete and coordinated service for each child accepted. We say "child" advisedly because the main idea is to treat the child as a whole—physically, emotionally, and socially. We want to eliminate the hitherto spotty career of the rheumatic fever patient who may be tardily or incorrectly diagnosed—too briefly or too solicitously treated. He may be turned loose without supervision until a relapse occurs, or may be confused all along the way by conflicting orders and suggestions on the part of physicians, health agencies, and schools. He may suffer, on the one hand, by neglect due to ignorance or misunderstanding. On the other, he may balk from over-treatment and confused planning. For instance, one adolescent boy although referred to our clinic, refused to attend for a year. When he finally reached us, he expressed surprise and relief at the frankness and clarity of information and orders given him. He stated that so many attending physicians and school doctors had told him different things at different times and so many different nurses and social workers had come "snooping around" that he was fed up on the whole thing.

At the admitted price of a good deal of time and effort the program has attempted to associate itself so closely with the family physician and with the helping agencies that in the mind of the child and his family, all units involved function as one and this one constant, throughout his entire period of growth and development.

# THE RHEUMATIC FEVER PROGRAM IN OKLAHOMA

CLARK H. HALL, M.D.
OKLAHOMA CITY, OKLA.

THE rheumatic fever service in Oklahoma is under the administrative direction of the Oklahoma Commission for Crippled Children. The medical supervision is by the director, who is also chief of the pediatric service of the Oklahoma Hospital for Crippled Children. We have a consultant cardiologist and a professional advisory committee. The active personnel includes in addition to the director, another part-time pediatrician, pediatric resident at the hospital, a medical social service worker, and a stenographer. All pediatricians are members of the Academy of Pediatrics.

The rheumatic fever service attempts to intensify its work in Oklahoma City and the immediate vicinity. No child referred for diagnosis and care is refused, however. It is recognized that it is not desirable to encourage patients with rheumatic fever to travel distances, but this particular program is sponsored by agencies serving the entire state and medical care cannot be refused on a geographical basis. Also, there are few facilities for this special care elsewhere in the state. To meet these problems better, itinerant clinics are held periodically in strategic points and the program is extended through the cooperation of the county health units and through home nursing visits. These locations were selected because a number of patients were centered about them and, in addition, the county health units are particularly active and anxious to cooperate in planning and holding the clinics. Medical eligibility is determined in the outpatient department of the hospital, itinerant clinics and in patients acutely ill referred to the service, by the director. Final decision on medical eligibility for hospital and follow-up care is made by the director. Unless acutely ill, all patients go through the pediatric outpatient department of the hospital first. This aids in eliminating a number of cases referred as rheumatic fever but which on examination are found to be something else.

In addition to our own medical social worker, social workers in the departments of public welfare and child welfare and in the state vocational rehabilitation department are utilized to obtain social data, home studies, or to work out family, social, emotional, and behavior problems.

The patients are referred to the rheumatic fever clinic by the pediatric outpatient department of the hospital, county health clinics, and

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private physicians. The special rheumatic fever clinic is held at the hospital once a week. These patients are in a separate waiting room and do not come in contact with those of the other services. The number of patients is limited and each patient is given an appointment.

Recently a dental clinic was started which is operated in conjunction with the weekly clinic. Extractions, fillings, and prophylactic care are carried out at this clinic.

When a patient is admitted to the hospital he is assigned to the special service which is in charge of the director. All facilities of the hospital are available including consultations from other services. At the time of the patient's dismissal from the hospital he goes to his home if his condition is satisfactory and if the social study that has been made of his home reveals it satisfactory for his return. If the child needs an extended period of supervision he is sent to the convalescent home where he continues under our care. Convalescent care for Negro patients is given at a boarding home located near the hospital.

Arrangements for follow-up care are made by the social worker. The field nurses of the Crippled Children's Commission and the nurses of the State Health Department carry on the follow-up work. They have received special instruction in rheumatic fever work. The follow-up care is under the supervision of the director who receives the reports of the patient's condition and home care.

A special referral blank is sent when the patient is discharged giving full instructions. Our medical social worker keeps in touch with the parents and receives reports between the patient's visits to the clinic. Every effort is made to educate the family regarding rheumatic fever and to secure wholehearted cooperation.

In the itinerant clinic the morning is spent in history-taking, physical examinations, and consultations with the patients and their families. In the afternoon a conference is held and each individual patient is discussed. The clinic staff, county health physicians and nurses, Commission field nurses, director of the County Welfare Department, and anyone interested in the work participate. Plans are outlined for the care of each patient who has been examined. Individual needs are pointed out and health and welfare agencies accept their respective responsibilities.

Efforts are made to encourage patients to secure as much general education as possible. We have found the county superindendents of schools to be interested in these children and they have been of great help in working out problems of individual children. Training and vocational problems are referred to the State Department of Rehabilitation. This agency makes a study of each case and then makes a report to us for our approval. If its plans are approved then this part of the child's education is commenced.

In addition to the care of the patients, which has been briefly described, there is an educational angle to the work. The hospital is one of the teaching units of the University of Oklahoma School of Medicine. The medical students, house staff, and student nurses work with the rheumatic fever patients and receive instruction and experience. The resident in pediatrics goes to the itinerant clinics with us and thus has a better understanding of the work. This should result in better care of patients with rheumatic fever in the future as these people settle in locations over the state.

# RHEUMATIC FEVER AND THE AMERICAN ACADEMY OF PEDIATRICS

## PUBLIC HEALTH ASPECTS: EPIDEMIOLOGY

T. Duckett Jones, M.D.,* and Benedict E. Massell, M.D.†
Boston, Mass.

I SHOULD like to take this opportunity not only to thank the Academy for this opportunity to be present but also for the honor that has been bestowed on me by electing me to Associate Fellowship.

It is not necessary to know the cause of a disease to learn something of its epidemic behavior and to learn some of the background of the disease which may be essential in the development of programs of care and prevention. Rheumatic fever has been known classically for at least fifty years as a triad consisting of tonsillitis, chorea, and arthritis. Since about 1900 the only studies which were being carried on were in two general fields, etiology and the straight clinical course of the disease. The association of streptococci and rheumatic fever has been developed to a considerable extent, beginning with the work of Poynton. During the subsequent years there have been many theories expounded which need not be reviewed here. Since World War I and to some extent the result of experiences in World War I, rheumatic fever has been, from the point of view of clinical significance and etiology, closely related to hemolytic streptococcic throat infections. The British literature antedated all the work on this subject. In this country the work has been stimulated and carried out by Alfred E. Cohn who is conducting the Army's rheumatic fever prevention program. There have been two significant groups in the studies that have been made, one of rheumatic fever families in the outpatient departments and in the various clinics caring for rheumatic fever, and two, of unknown or susceptible families. During the past few years studies have been clarified and intensified considerably by the development of improved techniques for the investigation of the various group A beta hemolytic streptococci. As you know, the original typing was done by a technique suggested by Griffith. More recently a method of precipitate typing has been suggested by Dr. Lansfield of Rockefeller Institute. To Dr. Cohn must go the credit for our present knowledge, for he is the first person to point out with any degree of positiveness that the beta hemolytic streptococcus is the cause of rheumatic fever. This work was done in rheumatic fever in relation to the recurrence of the disease in nurses in the Presbyterian Hospital, in the Porto Rico colony in New York, and in

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patients transported to Porto Rico. Dr. Cohn's experience and results in the late twenties and early thirties has been corroborated by practically all groups of workers in the field of rheumatic fever.

Dr. Paul in the early thirties, trying to determine the soil in which rheumatic fever flourished, pointed out very significantly that rheumatic fever occurred in a small group of carefully followed families in New Haven almost always in relation to or subsequent to respiratory infections, particularly infections with the beta hemolytic streptococcus. Sheldon and Colles in London in 1931 reported one of the early epidemics of rheumatic fever in the home. The work of Dr. Kuttner at Irvington House, watching for six years the development of rheumatic fever, has been a great success. Our experience at Good Samaritan Hospital has been almost the same with perhaps intensification in trying to control infection in the rheumatic fever colony, realizing that if we were not able to decrease the susceptibility to infection, we had no right to aggregate rheumatic fever studies.

It is safe to say that, in rheumatic fever families, the vast majority of recurrences occur in the postrelationship to epidemics of hemolytic streptococcus infections in the family, and that the number of recurrences in relationship to the number of children getting hemolytic streptococcus infection varies from year to year with the type of organisms and to other organisms. It will vary from 0 in some years to a very high percentage. In Dr. Kuttner's presentation tonight the amount was 50 per cent. In our experience about 50 per cent of the children who get streptococcus hemolyticus infections come down with rheumatic fever in two or three weeks.

There were a number of very interesting features in connection with the epidemiology brought out by Dr. Kuttner in her studies and to some extent by Dr. Cohn in his Navy studies that have corroborated the report that in children with rheumatic fever the presence of beta hemolytic streptococcus is reasonably unimportant. It may be fairly high and depend on the previous rheumatic fever epidemics in that colony. Whenever a new strain usually not present in families comes into the picture and spreads over the population, rheumatic fever begins to appear. It is also of interest in connection with Dr. Kuttner's work that some work of ours has shown that pathogenesis and spreadability generally go hand in hand. Some types of rheumatic fever spread without causing any appreciable volume of illness. I should like to point out also that clinical variance, as far as the diagnosis of streptococcic sore throat is concerned, is reasonably correlated, and that one-third of our rheumatic fever recurrences have not been streptococcus episodes. These episodes did follow a change in type from the nonpathogenic strain to the epidemic strain without clinical manifestations of tonsillitis or pharyngitis or a change from negative throat culture to a positive strain within an interval of two or three weeks of the beginning of their rheumatic fever. Children who develop rheumatic fever have so-called silent infections by

the streptococcus and have the same disease and the same immune bodies. As far as we know, the severity of the preceding hemolytic streptococcus infection in no way indicates the severity of the succeeding rheumatic fever.

I would like to point out that one of the problems under investigation in rheumatic fever are immune bodies, first determined by antistreptococcic titer arising in streptococcus covered soil by Dr. Paul in 1943, and it has been shown by many procedures that they are subject to a definite pattern. A certain number with definite streptococcus disease will come down with rheumatic fever. The type of streptococcus has helped us in deciding upon the type of disease. It depends upon the volume of the streptococcus infection rather than the particular types. Seasonal incidences and crowding as well as bacteriologic, clinical, and immologic patterns certainly point toward rheumatic fever being a disease associated with beta hemolytic streptococcus. How this is brought about we have no idea. Programs of prevention and care will tell us a great deal more about the etiologic factors other than streptococcus. Susceptibility on the basis of heredity may be one of many other factors.

# INDICATIONS FOR AND LIMITATIONS OF TREATMENT OF POLIOMYELITIS

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St. Louis, Mo.

POLIOMYELITIS is an acute infectious disease, the important feature of which is that it may damage or kill a variable number of the motor cells in the spinal cord and medulla and cause flaccid paralysis of the muscles supplied by these cells. The virus invades and becomes fixed in the nerve cells very early in the disease and there is no evidence that any form of treatment can limit the extension of the disease in the central nervous system or alter the future condition of the individual nerve cells which are invaded by the virus. It is thus evident that the disease is self-limited. In this paper we shall consider what symptoms of the disease deserve treatment and what our therapy may be expected to accomplish.

It is the custom to isolate every patient with poliomyelitis for the first twenty-one days of the illness. During the early part of this period he needs medical care because he is suffering from an acute infectious disease. This usually pursues a rapid and relatively mild course and in the average case the patient is not severely ill unless respiration is interfered with by the paralysis. When there is respiratory difficulty, postural drainage and suction, or even tracheotomy, are indicated in the bulbar type of the disease, and a respirator may be indicated, especially when there is paralysis of the muscles of respiration.

The general medical care of the patient is a medical or pediatric problem and will not be discussed in this paper. We shall concern ourselves with the measures which are used to combat the symptoms and sequelae of the spinal or usual type of the disease. These are stiffness of the neck and back in nearly all cases; stiffness and contractures of the muscles of the trunk and extremities in some cases; pain, hyperesthesia and muscle tenderness in some cases; muscle paralysis and pseudoparalysis and deformities in a variable number of cases; mass muscle movements and muscle substitution in a few paralyzed cases.

The measures used to combat these conditions are rest, sedatives, immobilization, restriction of activity, heat, exercise, muscle training and stretching, splints or braces, and surgery.

From the standpoint of treatment it is advantageous to divide the disease into four stages: The acute febrile stage; the subacute stage; the convalescent stage; and the chronic stage.

*The Acute Febrile Stage.*—The acute febrile stage rarely lasts over a week and it is during this period that the paralysis occurs. When the temperature returns to normal the patient may or may not be paralyzed

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to a variable degree, but there is little danger of further spread of the paralysis. The patient should be kept as quiet as possible and given general medical care. He should be permitted to assume whatever position in bed is most comfortable and he should not be disturbed and irritated by meddlesome therapeutics. If pain is a troublesome feature of the disease it is usually more satisfactory to control the pain by mild sedatives and by leaving the patient alone. Very rarely heat in the form of radiant heat or hot wet packs or warm baths may be used for the relief of pain, but these may do more harm than good while fever is present.

*The Subacute Stage.*—The subacute stage may be called the stage of muscle tenderness and early contracture. In the average patient with residual paralysis it lasts from four to eight weeks. In exceptional cases it may last three months or even longer. It begins when the fever subsides and continues until the pain and tenderness disappear.

At the beginning of the subacute stage the patient should be examined for muscle paralysis and tenderness, for pain on movement and for a tendency of certain muscle groups to contract and to cause deformities. The results of this examination should be recorded. This is not a complete or an accurate muscle examination, but it is a relatively crude muscle examination which enables the physician to separate the paralytic from the nonparalytic cases and to detect any tendency to the development of deformities in those with paralysis. Deformities do not occur in nonparalytic cases. It is thus evident that orthopedic treatment should be begun as soon as practicable after the fever subsides.

It will be found that practically all patients are left with a variable amount of stiffness of the neck and back and generalized weakness. In the nonparalytic cases these are the only aftermaths of the acute disease and these symptoms subside spontaneously and usually they will have disappeared by the end of the twenty-one-day isolation period. They need no special treatment and the patient should be permitted to resume his activity as he regains his strength. The nonparalytic cases may comprise more than one-half of the total seen during an epidemic.

The remainder of the patients who survive the acute disease are left with a variable amount of flaccid paralysis of the voluntary muscles. This paralysis is often described as being segmental in character in that all muscles supplied by a given segment of the spinal cord are affected. I prefer the term *spotty paralysis*, because it is irregularly distributed, except that the lower extremities suffer more often than do the upper. It is due to injury to the motor cells in the spinal cord and there is no evidence that this paralysis is due to anything else. Some of the motor cells are killed by the virus and the function of these is irretrievably lost and will not be regained. Others are merely damaged to such a degree that they do not function. These will recover and will again send motor impulses to the muscles which they supply. And they will do this without the aid of any therapy. Consequently, during this stage there is

no indication for any therapy directed to a restoration of power in the muscles, but the paralyzed muscles should be protected from stretching.

In addition to the paralysis due to nerve cell damage, there is also present a variable amount of pseudoparalysis. This is the reflex inability or unwillingness of the patient to contract certain normal muscles with intact neurones because this causes pain. This condition is not peculiar to poliomyelitis but is present to a variable degree in all painful conditions. It needs no special treatment during any stage of the disease because these muscles will resume their function and regain their normal power when the pain subsides.

In addition to the general weakness, stiffness of the neck and back and the spotty paralysis, the subacute stage is characterized by muscle pain, tenderness, and hyperesthesia and by a tendency for the tender muscles to contract or shorten unless they are completely paralyzed. The degree of pain, tenderness and tendency of the muscles to contract or shorten varies greatly in different patients. In some patients these symptoms are very troublesome, but in the majority, and even in many of those with extensive paralysis, there is little or no spontaneous pain or tendency to contracture. However, some of the muscles are tender and pain can be elicited by deep pressure or sudden stretching of these muscles. These symptoms will disappear spontaneously, but they may be prolonged by injudicious treatment or by unrestricted activity. When contractures are beginning or pain is present they should be treated both for the comfort of the patient and because the contractures may occur early in the disease and cause deformities which will stretch paralyzed muscles and shorten the stronger muscles and be troublesome to correct if they are permitted to exist very long.

The pain, tenderness, hyperesthesia and tendency to contracture are most effectively treated by rest. For this reason the paralyzed patient should be placed on a firm mattress with boards under the mattress to prevent sagging and the paralyzed limbs should be maintained in the physiological position. During much of the day the patient should lie on his back with small pads under his knees to maintain slight flexion of the hips and knees and the feet should be supported at a right angle by pillows or a board at the foot of the bed. The arms may be at the sides and the position of the elbows, wrists, and fingers may be ignored. If there is deltoid paralysis and a tendency to adduction contracture of the shoulders, the arms should be maintained in a position of moderate abduction. The patient should be turned on his side or face for part of the day for comfort and to prevent pressure sores. It is also advisable, but not necessary, that the major joints of the paralyzed extremities be moved passively through as great a range as possible without causing undue pain. This passive movement of the extremities may be done once or twice a day and when lying on his side the patient may be permitted to flex the spine and neck if this does not cause undue pain.

Every patient should be examined for abdominal paralysis early in the subacute stage and if this is found the abdominal muscles should be supported and protected from stretching by a light fabric corset which can be laced snugly around the abdomen.

These simple procedures are all that are necessary in the average case. The tendency of certain muscles to contract and cause flexion deformities early in the disease is usually associated with pain. In some patients pain is a prominent feature of the subacute stage of the disease and this pain may be accompanied by contracture of the painful muscles. This pain and tendency to contracture of the muscles are most simply and successfully treated by immobilizing the involved extremities in the physiologic position. This immobilization may be accomplished by padded splints of metal or of plaster of Paris or by plaster-of-Paris casts. When properly fitted these are comfortable and do not interfere with the circulation in the extremity. They do not cause excessive atrophy of the muscles or excessive stiffness of joints in the paralyzed extremity. In order to minimize the stiffness it is desirable that the splints or casts be removed once or twice a day and the major joints of the extremity carried through as great a range of motion as is permitted. Care should be taken to avoid undue pain due to stretching of the tender muscles and massage and active contraction of the tender muscles are avoided because it is believed that these prolong the stage of pain and tenderness.

Heat, either as dry radiant heat or hot moist fomentations or warm baths, may be used for its analgesic effect and by lessening the pain this tends to lessen the contracture or so-called *spasm* in the tender muscles which appears to be secondary to the pain.

It is to be emphasized that this local heat in whatever form it may be applied to the muscles has no specific effect on the disease. It does not prevent or lessen the permanent paralysis, nor does it hasten the disappearance of the temporary paralysis, as these conditions are due to injury to the motor cells in the spinal cord. The heat does not relieve the stiffness or prevent the contracture of muscles and the development of deformities. However, if the heat is combined with the daily careful stretching of the shortening muscles and the maintenance of the patient in the physiologic position the early deformities can be prevented. On the other hand, it is much simpler and less expensive to accomplish the same result by the application of a properly fitting cast or splint. And it should be emphasized that correctly fitted splints or casts can and do prevent the early deformities which tend to occur during the subacute stage of poliomyelitis.

It is thus evident that during the subacute stage the most important therapeutic agent at our command is rest. The acute disease has run its course when the fever subsides and the damage is done. Some of this is permanent and some is temporary. At this stage the inflammation which followed the invasion of the central nervous system by the virus is

subsiding and, as in any other tissue, rest is indicated until the inflammation is gone. It is believed that early attempts to restore function to the paralyzed muscles will interfere with the healing of the inflammatory process in the nervous system and thus prolong the stage of pain and tenderness. During this period the general health of the patient should be looked after and he should be given a nutritious high vitamin diet and extra vitamin B.

The regime of the subacute stage should not be prolonged beyond the period indicated by the symptoms present in the given patient and it should be discontinued as soon as the pain, tenderness, and tendency to contracture disappear. It is also to be noted that during this stage the splints or casts are used only to protect the paralyzed muscles, to prevent deformities, and to relieve pain, and they are applied only to extremities where they are needed for this purpose. They are discontinued as soon as they are no longer needed. The immobilization of an extremity for a few weeks does no harm, but permanent injury may result if this is continued for many months.

The same is true of heat. It must be used with discretion. I have seen patients in whom the prolonged application of hot fomentations and the maintenance of these patients in the correct standing position in bed over a period of six months or more undoubtedly prolonged the stiffness, pain, tenderness, and contracture of muscles.

*The Convalescent Stage.*—For the purpose of treatment the convalescent stage begins when the pain and tenderness subside and ends when there is no longer any expectation of further recovery in the paralyzed muscles. In a paralyzed patient the convalescent stage lasts from six months to two years or more. It really begins when the fever subsides, but during the subacute stage rest dominates the therapeutic regime and now an effort is made to restore normal movement to the joints and to increase the power and improve the function in the paralyzed muscles. This is accomplished by muscle training, graded exercises, regulated activity, and protection of the weakened muscles from overuse and stretching.

In order that the treatment may be as effective as possible, stock should be taken of the patient's musculature. A careful muscle examination is made and not only the ability of the various muscle groups to contract, but also their relative strength is noted and recorded. Since the patient has been partially immobilized during the subacute stage by splints or posture, the muscles need loosening up by exercise and there may be some joint stiffness which will interfere with a satisfactory muscle examination. Consequently, it is advisable to place the patient in a tub of warm water once or twice a day and to let him exercise his limbs in the water and to remove all splints and let him move around in bed freely for a few days before the muscle examination is made.

Usually it will be found that the paralysis in a given patient is considerably less than was noted in the beginning of the subacute stage;

that is, some of the muscles which seemed to be paralyzed have now regained their ability to contract and this recovery has occurred without any treatment except rest and protection of these muscles from stretching, and this occurs even while the limbs are immobilized in plaster casts if these have been used.

Part of this recovery is due to the spontaneous disappearance of the pseudoparalysis and part of it is due to the fact that the nerve cells which supplied some of the muscles were damaged but not killed by the disease and have now recovered and are sending motor impulses to the muscles. It may be so great that a patient who was extensively paralyzed may have some power in all of his muscles by the time the pain, tenderness, and tendency to contracture have subsided. Such a recovery is a good prognostic sign and it is probable that this patient will make a satisfactory recovery with little or no permanent paralysis. On the other hand, in another patient one or more extremities may have been completely paralyzed early in the illness and may remain completely paralyzed at the end of the subacute stage. This is a bad prognostic sign and it is probable that very little power will be regained in this extremity.

At the beginning of the convalescent stage we have a patient with no deformities and with a variable amount of paralysis and stiffness. From the muscle examination we know the extent and distribution of the paralysis, but we do not know whether or not it is permanent. If the nerve cells responsible for the paralysis are dead it will be permanent. However, they may be still living but so badly injured that they are not able to function. These cells will recover and regain their function. Consequently, we maintain a hopeful attitude and treat all paralyzed muscles as though the paralysis were temporary or partial. This attitude is justified by our knowledge of the course and pathology of the disease, because some, or complete spontaneous, recovery is the rule.

We cannot restore dead nerve cells or create new pathways, but we can protect the paralyzed muscles from stretching and overuse in order that they may be able to function when and if their motor nerve supply is restored. We can also prevent many deformities due to muscle imbalance and train the patient to use his muscles effectively. By carefully graded and supervised exercises we can develop the maximum power in the weakened muscles and thus neutralize the muscle imbalance in many patients.

Restriction and regulation of activity is one of the most important problems in the care of patients during the convalescent stage of poliomyelitis. As I have stated the nonparalytic patients need no supervision and may return to their normal activities after the isolation period, but they should return every few months for examination because some paralysis may have been overlooked and may be evident at later examination and require treatment.

The patients with paralysis need restriction of activity because fatigue and overuse may cause weak muscles to lose power. Consequently, those patients with extensive paralysis of the lower extremities should be kept in bed for awhile and allowed up gradually. After each increase in activity the patient should be followed carefully and if it is found that the involved muscles are losing power the periods of rest should be lengthened and the activity should be restricted. This restriction should be tempered with judgment, especially in an adult, because he should be returned to his occupation as soon as possible or he may have to change his occupation on account of some handicap resulting from the illness.

In a child there is not the same economic urge for the early resumption of activity, but there is no reason for prolonging the stage of invalidism any more than necessary. And children should be allowed on their feet and back to school as soon as this can be done without interfering with the maximum recovery.

When the nerve cells recover, function will be restored to the paralyzed muscles. However, this restoration of function can be hastened and rendered more complete by muscle training. Lovett defined this as an "attempt to restore a cerebral motor impulse to a muscle" and stated that muscle training aims first at "establishing a better coordination between the remaining nerve fibers supplying the affected muscle; and second, at securing contraction of the desired muscle."

Muscle training is directed at the weakened or paralyzed muscles and is continued until further hope of improvement in these muscles is abandoned. It consists of carefully graded and supervised exercises and these are most efficiently carried out under the supervision of a trained physical therapist, but may be directed by a member of the patient's family who has been instructed by the physician. The period of exercise may be preceded by light massage and local heat, because warm muscles contract better than cold ones. The patient is instructed to perform movements which will involve the contraction of the weak muscles and the relaxation of the strong muscles. Muscle substitution and mass movements are watched for by the instructor and are eliminated if they appear. Depending upon the strength of the muscles the movements are carried out with assistance, with gravity eliminated, against gravity, and against resistance.

In some clinics some of the exercises are carried out under water in therapeutic pools or baths. The water has no specific effect on the muscles but neutralizes the effect of gravity and may enable weak muscles to accomplish movements which they could not perform against gravity or friction. Care is taken to avoid fatigue of the weakened muscles and to protect them from prolonged stretching, because these may cause loss in power. Any shortening of muscles which may have resulted from contractures during the acute and subacute stages of the

disease is also corrected by gradual passive stretching of these muscles and by active exercises until the normal range of movement is restored.

At appropriate intervals muscle examinations are performed and the results are recorded and compared with those of preceding examinations in order to determine the improvement or lack of improvement in the patient and the treatment may be altered as indicated.

In addition, the patient is taught balance and the effective use of his muscles in walking and an attempt is made to correct muscle imbalance.

During the convalescent period splints may be prescribed and fitted. They are used to protect paralyzed or weak muscles from stretching and from overuse, to prevent late deformities due to muscle imbalance or growth, and to improve the function in the paralyzed extremities or trunk. These splints may be altered or discarded or resumed when indicated by a change in the patient's condition.

*The Chronic Stage.*—The chronic stage is present when in spite of adequate protection and treatment there is no appreciable gain in power in the paralyzed muscles. It lasts as long as the patient lives. During this period late deformities may occur from muscle imbalance, growth, or abnormal use of the paralyzed extremities. Splints or braces may be used to minimize or prevent these late deformities and to enable the patient to use the paralyzed parts more effectively. Surgery is also indicated to correct and prevent deformities and to improve the function in the paralyzed extremities or trunk.

## SUMMARY

Poliomyelitis is self-limited and if deformities are prevented the end result is determined largely by the damage done to the motor cells during the acute febrile stage. Many patients recover completely without treatment and others remain extensively paralyzed in spite of the best treatment. No known treatment affects the degree or extent of the initial paralysis, but we are able to ameliorate the effects of the disease.

In the acute febrile stage the treatment is general medical care plus protection of the patient from irritation. If the respiratory function is affected, efforts must be made to save the patient's life.

In the subacute stage rest and immobilization dominate the treatment. We relieve the patient's pain, protect paralyzed muscles from stretching, prevent early deformities due to the contracture of painful muscles, and give the injured nerve cells the best possible chance to recover.

In the convalescent stage we protect and restore the maximum of power to the weakened muscles, stretch the contracted muscles and restore normal movement to the parts, and train the patient to use his weak extremities.

In the chronic stage we prevent or minimize late deformities and increase function by braces and surgery.

# PAROXYSMAL TACHYCARDIA IN AN INFANT THE FOURTH DAY OF LIFE—RECOVERY WITH DIGITALIS

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PAROXYSMAL tachycardia in the newborn is unusual and differs from the disease in older children mainly by its characteristic of persistence until cardiac failure and sometimes death follow, unless proper treatment is given. It is most readily treated with digitalis according to the advice of Hubbard,[3] who has reviewed nineteen cases under 1 year of age and has reported nine cases under 8 months of age. Among the sixteen treated with digitalis, there were fifteen recoveries and one death which proved to be from sarcoma of the conduction system. The case reported here is an example of good response to digitalis.

Baby D, a white male child, was born March 26, 1943, weighing 4,270 Gm. and measuring 52.5 cm. The mother's age was 33 years and there was one well child 3 years old. There was no history of disease in the family. During pregnancy the only medicines taken were an occasional aloin, strychnine, and belladonna tablet, soricin tablets, a few seconal tablets and occasional doses of elixir turpin hydrate. Delivery was spontaneous from L.O.A. in eight hours and forty-six minutes of labor. Sedatives administered were scopolamine gr. $\frac{1}{100}$ six hours before birth and sixteen minutes of nitrous oxide and oxygen. The infant seemed well except for a fractured left clavicle, understandable because of his large size. His appearance was good, and he was able to nurse and swallow strongly. The fourth day of life he had a short period of cyanosis and was treated with oxygen, but showed no cardiac or respiratory signs. The fifth day he showed periodic cyanosis, was kept in oxygen constantly, and was found to have a constant high heart rate of 300 per minute. This rate persisted and was soon accompanied by cyanosis and dyspnea. Progressive loss of appetite, refusal to nurse, and occasional vomiting were noted. Examination by electrocardiogram disclosed a rate of 300 beats; although we had counted the rate as between 260 and 280. This rapid rate continued approximately twelve hours with the development of cyanosis, especially noted in finger tips, nail beds, and lips. There was an enlarged liver which could be felt 2 cm. below the costal margin and an enlarged heart demonstrated by teleoroentgenograms. There were also a few fine moist râles heard over the lung bases and the respiratory rate was 80. Digitalis was given as follows: Fifth day at 10:18 P.M. Digalen 1 c.c. subcutaneously (2 c.c. equals 1 cat unit); sixth day 4:15 A.M. Digalen 0.5 c.c. subcutaneously. From 10:18 P.M. to 6:30 A.M. the infant's condition did not change; there was constant cyanosis and rapid rate of 280, the rate being taken every half hour. At 6:30 A.M. the rate dropped to 114. Subsequently at 7 A.M. the rate was 116; at 8 A.M., 116; at 9 A.M., 112; and at 10 A.M., 112. The respiration was 95, the infant's color

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was much improved, he was crying with hunger and seemed to be over the incident of tachycardia. The pulse was followed closely, but no more digitalis was given. The infant has been followed one year with no recurrence of the incident and a normal growth in every way.

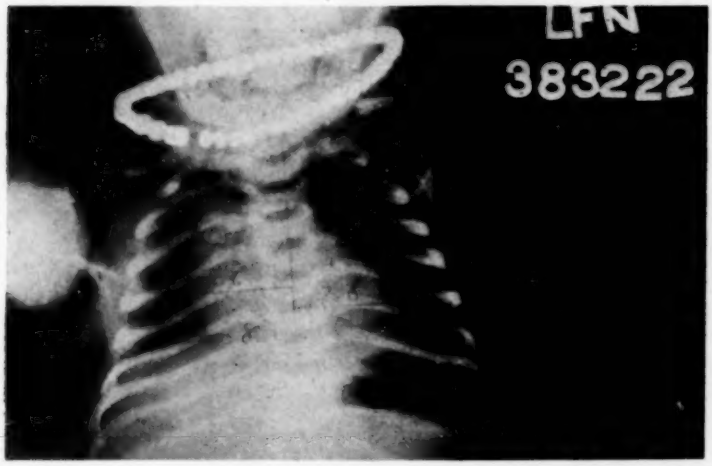


Fig. 1.—Teleoroentgenogram, Baby D. Heart in decompensation. Internal diameter of chest 8.5 cm., width of heart 5.4 cm.

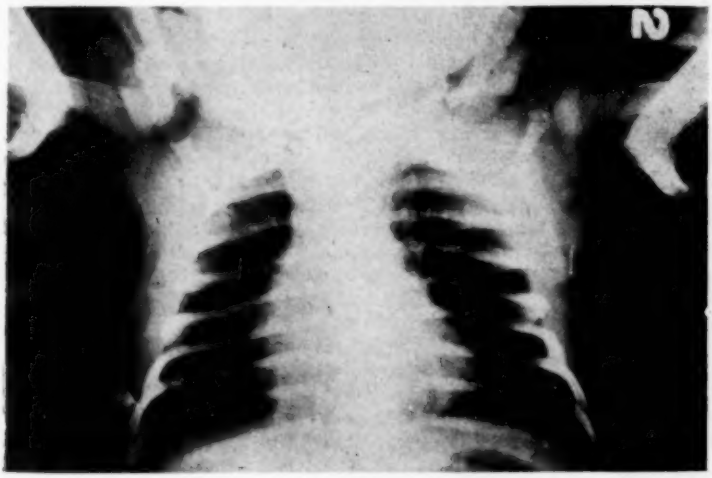


Fig. 2.—Teleoroentgenogram, Baby D. Heart size normal following treatment.

The baby's weight was 9 pounds, 4 ounces, and the amount of digitalis given here, 75 per cent of a cat unit in a six-hour period, entirely controlled the rate. It was expected that the tachycardia might recur and more digitalis have to be given. However, no more digitalis has been given since the sixth day of life and there has not been a recurrence.

The onset of paroxysmal tachycardia in the first two weeks of life has been recorded at least nine times (Table I) and many cases are recorded within the first month of life. Cases appearing within the first month are similar as to weight and size, requiring comparable doses of digitalis, but the earlier in life this exaggerated rate appears, the more urgent becomes the need for early treatment. Werley's[6] patient actually died of congestive failure, and our infant certainly looked in extremis until the rate was controlled.

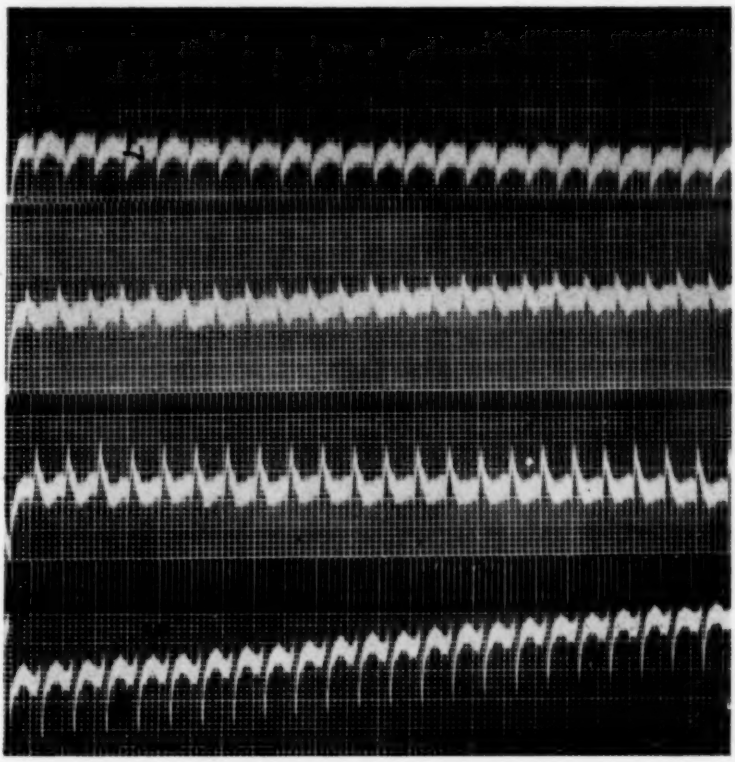

Fig. 3.—Electrocardiogram, Baby D. Paroxysmal auricular tachycardia, right axis deviation, rate 300, QRS .06.

Examples of digitalization are detailed by Hubbard[3] who gave, in general, the calculated dose for full digitalization at once, and then repeated smaller doses as necessary. For an infant of 7 pounds, a dose of 0.1 Gm. digifolin was safe in five instances and was followed by smaller periodic doses. The toxicity of digitalis was emphasized by Hubbard's Case 8, an infant weighing 7 pounds, 10 ounces, who showed gross irregularity after the second dose of 0.1 Gm. digifolin in twenty-four hours. The possible rapid action of digitalis was shown by Taran

and Jennings[4] when, after 1 U.S.P. unit was given intramuscularly to an infant weighing 6 pounds, 12½ ounces, the rate fell in fifty minutes from 260 to 150 per minute. Nine days later, when the child had a recurrence and was given ½ cat unit intramuscularly, one of the greatest fears of digitalis therapy, ventricular fibrillation was realized.

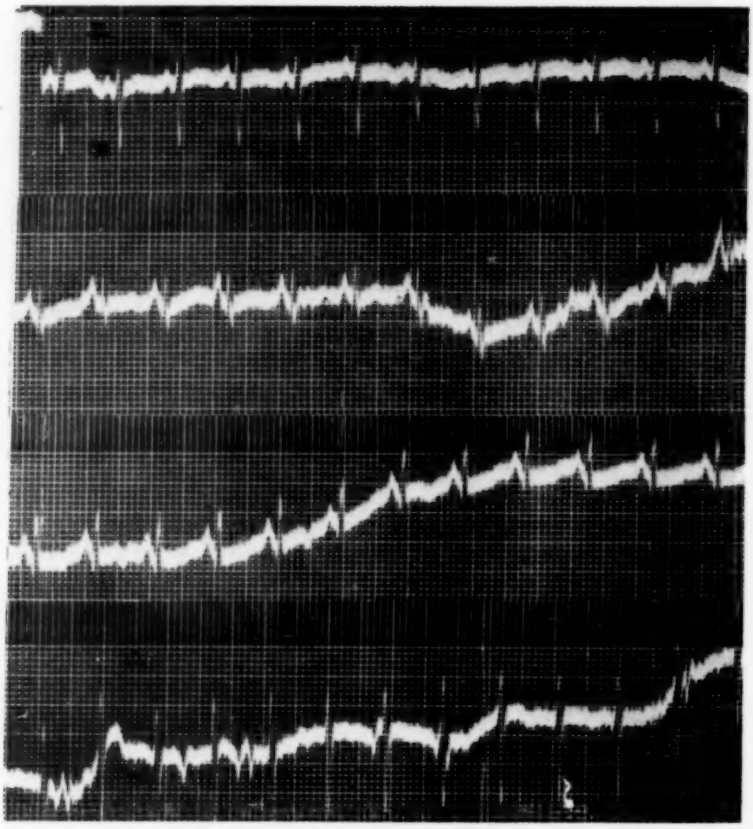

Fig. 4.—Electrocardiogram, Baby D. Sinus tachycardia, right axis deviation, rate 150. Taken after digitalis which corrected the paroxysmal tachycardia in approximately eight hours.

We had one 10½-pound infant in extreme heart failure to whom was given 2 cat units (2 c.c. digalen) intramuscularly and who showed directly after a complete heart block with rate of 60 per minute. These few instances serve to show the necessity for caution in the use of digitalis and the necessity for remembering White's[7] statement that when ventricular fibrillation or various high grades of heart block are seen, not primarily from the other conditions, 50 to 90 per cent of the lethal dose of digitalis has been given.

TABLE I

PAROXYSMAL TACHYCARDIA AT BIRTH OR IN FIRST TWO WEEKS OF LIFE WITH DIGITALIS DOSAGE AND OUTCOME

| AUTHOR | AGE AT ONSET | CARDIAC RATE | WEIGHT | DIGITALIS | COMMENT |
|---|---|---|---|---|---|
| Werley[6] | 4 days | 307 | | None | Died |
| Doxiadee[2] | 7 days | 240 | | | Recovered |
| Carr and McClure[1] | Before birth | 192 | | None | Recovered |
| Taran and Jennings[4] | 7 days | 250 | 6 lb. 12½ oz. | 1 U.S.P. cat unit I.M. stat.; 5 min. P.O. t.i.d. for 3 days; 10 min. P.O. daily for 2 days; 9 days later ½ U.S.P. unit I.M. stat. | Recovered |
| Tarnower and Lattin[5] | Birth | 225 | 8 lb. 12 oz. | 2 min. P.O. t.i.d. for 2 days, then ½ cat unit I.M. | Recovered |
| Tarnower and Lattin[5] | 8 days | 264 | | None | Recovered |
| Hubbard[3] (Case 8) | 10 days | | 7 lb. 10 oz. | 0.1 Gm. digifolin; 0.1 Gm. in 24 hr., gross irregularity with auricular flutter | Recovered |
| Hubbard[3] (Case 9) | 12 days | | 8 lb. 13 oz. | 0.05 Gm. digifolin I.M., 9 hr. later 0.05 | Recovered |
| Howard | 4 days | 300 | 9 lb. 4 oz. | ½ U.S.P. cat unit I.M. stat., ¼ unit 6 hr. later | Recovered |

Many other drugs have been tried only to be discarded and pronounced unsafe for this neonatal group of cases of tachycardia: physostigmine salicylate, five seconds after administration of $\frac{1}{300}$ gr. complete cardiac standstill for ten seconds; quinine and urea hydrochloride, 1½ gr. without effect; pilocarpine nitrate, $\frac{1}{60}$ gr. without effect; quinine sulfate and quinine bisulfate, no effect; quinidine sulfate, aggravated condition making patient worse; morphine and bromide, chloral hydrate and phenobarbital; general sedatives which may have a place in older children and occasionally in infants to prevent constant prolonged crying; mecholyl acetyl choline, acetyl-$\beta$-methylcholine chloride, 5 mg. gave sudden and alarming circulatory arrest and collapse counteracted by atropine gr. $\frac{1}{300}$ intravenously.

In newborn infants with paroxysmal tachycardia, it is possible to tell whether the type is auricular or nodal in origin. The type with ventricular origin has not been shown in the newborn. The first two types should both be treated with digitalis. Digitalization with caution starting with one-half the calculated dose, followed in four hours with another quarter dose and thus obtaining a curative amount by steps seems the wise course.

## COMMENT

In diagnosis, pneumonia and idiopathic hypertrophy of the heart are most commonly confused with this condition. The tachycardia itself, however, is such a striking factor and so clearly observable as a cause of cyanosis and heart failure that it will seldom be confused with infection. Death may follow, from the tachycardia alone, as a cause of heart failure.

Study of the pulse of newborn infants has shown that even with extreme crying the rate does not exceed 180 per minute and only reaches this height for short intervals. A persistent rate of over 200 practically means paroxysmal tachycardia and is an indication for treatment.

Our records showed only five cases of paroxysmal tachycardia in children, their ages being from 4 to 12 years, and all being auricular in type. One was controlled by phenobarbital, one by drainage of a purulent sinusitis, one by quinidine sulfate, 200 mg. daily, and phenobarbital, one by quinidine sulfate 100 mg. three times daily combined with digitalis, and one case was so slight that only head-downward position, was used. These five older children did not in any case show a tendency to congestive failure from persistent high rate, thus illustrating the difference between newborn infants and older children with paroxysmal auricula and nodal tachycardia.

## SUMMARY

Paroxysmal auricular and nodal tachycardia in the newborn is recognized by a heart rate of over 180 per minute and is most safely treated with digitalis.

Good response was obtained with ½ cat unit followed in four hours by ¼ cat unit in an infant weighing nine pounds four ounces. One cat unit is the upper limit of the safe amount to give a newborn infant.

Five older children with this condition failed to show the tendency of the newborn to persistent high rate and congestive failure.

## REFERENCES

1. Carr, J. G., and McClure, W. B.: Am. Heart J. **6**: 824, 1931.
2. Doxiades, L.: Klin. Wchnschr. **9**: 454, 1930.
3. Hubbard, John P.: Am. J. Dis. Child. **61**: 687, 1941.
4. Taran, L. M., and Jennings, R. G.: Am. J. Dis. Child. **54**: 557, 1937.
5. Tarnower, H., and Lattin, B.: New York State J. Med. **52**: 805, 1942.
6. Werley, G.: Arch. Pediat. **42**: 825, 1925.
7. White, Paul D.: Heart Disease, ed. 2, New York, 1939, The Macmillan Company, p. 549.

# ASPHYXIA NEONATORUM

## An Evaluation—Etiology and Treatment

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ADVANCES in our knowledge of asphyxia have followed the introduction of the chemical theory of respiration by Henderson[1, 2, 3] in America and Haldane[4] in Great Britain. It is now generally accepted that the respiratory function is under the control of a medullary center which is activated by the carbon dioxide of the blood. Thus, when the blood carbon dioxide reaches a critical concentration, the center is stimulated and respiratory movements result with the inhalation of oxygen and the exhalation of carbon dioxide.

In asphyxia, due to the failure of the respiratory center to respond to the normal stimulus of blood carbon dioxide, there is a progressive accumulation of this gas with a corresponding lowering of oxygen concentration. Thus the longer the asphyxia lasts the more serious it becomes, since the oxygen content of the blood may fall so low as to be beneath the basal metabolism requirements and fatality may result, or at least there may be some permanent impairment of brain function. This concept of oxygen-want as the cause of asphyxia is supported by a preponderance of evidence.

Many investigators have studied the relation of obstetric factors to neonatal apnea. Some types of anesthesia and analgesia given to the mother have been found to be important in delaying the start of respiration in the infant.

Litchfield and Beilly[5] list the use of analgesic drugs among the factors leading to neonatal apnea, and advocate the use of caudal anesthesia and light inhalation anesthesia. Other factors which they consider dangerous to the infant are: abnormal delivery, prematurity, early rupture of the membranes, use of outlet forceps, a long second stage of labor, and too rapid labor. Kotz and Kaufman[6] stated that sedatives and general anesthetics in any amount increase the incidence of asphyxia in the infant in direct proportion to the dose of the sedative or the duration of general anesthesia. They also list prematurity and trauma of labor (especially when normal trauma is accentuated by dystocia or operative delivery) as causes of asphyxia.

Lund[7] studied the relation of various inhalation anesthetics and analgesic agents to asphyxia neonatorum. He found that nitrous oxide, ethylene, and cyclopropane did not seem to influence the incidence of

The alpha-lobeline hydrochloride used in this work was supplied by the Ernst Bischoff Company, Inc., Ivoryton, Conn.



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asphyxia neonatorum when used as analgesic agents, and that nitrous oxide, if properly administered, could be given over long periods without significant effect on the infant. On the other hand, cyclopropane and other agents caused an increase in the incidence of fetal asphyxia if used in concentrations sufficient for anesthesia in operative delivery, and the incidence of asphyxia varied directly as the duration of such anesthesia.

Eastman[8] has shown that under certain conditions nitrous-oxide-oxygen anesthesia administered to the mother during labor produces fetal anoxemia. The fetal anoxemia resulting is relatively greater than in the parturient, and may reach a critical point to cause impairment of fetal respiration and even death.

Mild degrees of anoxemia thus induced increase respiratory movements, accelerate heart rate, and increase blood pressure. These reactions presumably are compensatory mechanism, the object of which is to restore a normal relationship of blood bases. With the intensification of anoxemia, however, the asphyxia becomes increasingly serious, for the pulse rate slows, the blood pressure falls, and death from failure of the vital center ensues. With the use of several different analgesic drugs for the alleviation of pain at parturition, Lewis[9] noted that increasing narcosis and asphyxia of the newborn was an accompaniment of trauma from prolonged labor, instrumental or operative delivery.

The futility of the older methods of resuscitation such as "slapping, swinging, tubbing, etc.," are at once obvious. Such vigorous methods not only fail to furnish a rational explanation of their value but they add to the shock, lower body temperature, and increase the acidosis. Mouth to mouth breathing, so frequently advocated, is much less effective than commonly believed and even when successful is accompanied by serious drawbacks. Thus, Wilson, Torrey, and Johnson[10, 11] have shown that the atelectatic lung cannot be opened by gases under pressure in the trachea alone. Even when resuscitation is accomplished by mouth to mouth breathing, not infrequently extensive emphysema follows its use and may cause death even in the absence of other complications; septic pneumonia and lung damage are other serious possible consequences of this method. The mechanical respirator is of little value in the asphyxiated infant, although it may be quite useful in carrying the patient through syncopal periods once respiratory function has been established.

For normal respiration, therefore, both anatomic and physiologic integrity of the respiratory system is necessary. It should be remembered, however, that a peripheral or an obstructive type may occur. Thus, mucous plugs or congenital malformations may prevent the normal exchanges of gases and produce atelectasis just as effectively as failure of the respiratory center. A combination of both centrally and peripherally acting causes may be present.

It has been generally stated that two in each one hundred babies refuse to breathe promptly at birth. Of these two, one-half will never breathe because of permanent injury, and the remainder, that is, one in two hundred, will live or die according to the measures of resuscitation used by the obstetrician.

If drugs and anesthetics are improperly used as many as 30 to 50 per cent may fail to breathe promptly at birth. Final results depend, therefore, on the method of delivery, drugs, and anesthetics used before and during the delivery and the knowledge of resuscitation presented by the obstetrician.

A modification of Flagg's[12] classification of asphyxia serves well as a guide to the degree of asphyxia and the type of treatment to be employed.

1. *Mild Asphyxia.*—The infant resists movements of the head and extremities. Mucous plugs and amniotic fluid fill the mouth and pharynx. The treatment is suction to remove obstructing material and the administration of gas mixtures with subsequent response.

2. *Moderate Asphyxia.*—Muscle tonus is absent; there is no resistance to opening of mouth. No reflex irritation is induced by aspiration or stimulation of glottis. The treatment is aspiration of mucus and debris from the larynx and trachea by laryngeal intubation or on direct laryngoscopy and insufflation of gas mixture.

3. *Asphyxiated.*—The infant does not respond to attempts at resuscitation. The appearance is livid and pallid, there is absence of respiratory movements, and an occasional flicker of the heart impulse may be detected through the chest wall. The upper respiratory tract becomes a collapsed tube. The treatment demands opening the respiratory passages by allowing gas mixtures delivered under measured pressure. This will overcome atelectasis, allow immediate diffusion and absorption of blood gases, relieve right-side heart congestion, and improve left-side heart circulation, and cause stimulation of the respiratory center.

This review is a follow-up study concerned chiefly with the central form of asphyxia neonatorum and the use of alpha-lobeline hydrochloride, used intravenously, in its treatment. The first study on the use of this drug in asphyxia neonatorum was carried out in 1938. Since then eighteen more asphyxiated infants, particularly those delivered during a difficult or prolonged labor in which lengthy general anesthesia was employed, were added to our present review and detailed discussion. In our summation of the treatment we noted the varied procedures carried out by our large attending staff. Advantages and disadvantages of these methods will be fully discussed later in this paper.

The following are brief résumés of some of the cases:

CASE 1.—An infant, weighing 6 pounds, 4 ounces, had cyanosis at birth which changed to marked pallor. Maternal medication had been

morphine sulfate, ⅙ grain hypodermically about three hours before delivery. The position was L. O. A. Two turns of the cord were around the neck. There was no sign of respiration and no cry. The infant was in a relaxed state, and heartbeats were very feeble. Alpha-lobeline hydrochloride was injected into the umbilical vein, and the cord was milked toward the infant; oxygen and carbon dioxide were started. Within fifteen seconds after the injection there was a gasp with a few deep inspirations. A short period of apnea followed and the respiration was weakly resumed for a short time immediately after the oxygen and carbon dioxide mixture was given through the trachea. However, at the sign of another period of apnea, a second dose of alpha-lobeline hydrochloride was injected hypodermically, and soon thereafter the respiratory rate became frequent and was re-established. The cardiac impulse became visible and stronger. There was a tremendous increase in the amplitude of most of the respirations with extensive excursions of the thoracic wall. The infant was kept warm, and one hour later rhythmic breathing continued. A mixture of carbon dioxide (7 per cent) with oxygen (93 per cent) was given to this child p. r. n. over a period of five days. The infant was discharged at the end of two weeks in normal condition.

Case 2.—The mother had been in labor for twenty-six hours, followed by forceps delivery under gas-ether anesthesia. The infant, weighing 6 pounds, 8 ounces, was pallid at birth and refused to breathe spontaneously. The throat was cleared of mucus, and insufflation with oxygen and carbon dioxide was started and adrenalin hydrochloride injected. The child took several gasps (used resuscitator) but there was no other response and on autopsy atelectatic lung tissue was present.

Case 3.—The mother was in labor for thirty-eight hours. The infant was delivered markedly pallid and did not breathe spontaneously. The cardiac impulse was barely visible. Soon after delivery the infant received an ampule of alpha-lobeline hydrochloride. Within fifteen seconds after the injection, rapid but irregular respirations began. There was a period of apnea again, at which time oxygen and carbon dioxide mixture was given directly into the trachea in small amounts. Soon after that the rhythm was re-established, both amplitude and rate being in normal relationships.

Case 4.—A male infant, weighing 7 pounds, 3 ounces, was cyanotic at birth and did not breathe. Immediately on delivery an ampule of alpha-lobeline hydrochloride was injected directly into the umbilical vein, the throat was cleared of mucus by suction, and oxygen and carbon dioxide mixture was given in small amounts directly into the trachea. Within twenty seconds after the injection of alpha-lobeline hydrochloride respiration started very rapidly, gradually increasing in amplitude. The rhythm was fairly well established for about one minute and followed by a period of apnea. Shortly thereafter rhythm was re-established. The respirations became deeper, the general tonus of infant increased, and the cardiac impulse became stronger. The respiratory rate became regular and there were extensive excursions of the thoracic wall with increase in pulmonary ventilation. The child was put in an incubator. Oxygen and carbon dioxide mixture was continued throughout most of that day and the following day as well. At the end of fourteen days the child was discharged in a good condition.

CASE 5.—The mother, a primipara, was in labor twenty-four hours. The infant did not breathe and was markedly pallid. The cord was cut, the cardiac impulse was very weak, and there was an occasional weak gasp with very shallow respiration. Alpha-lobeline hydrochloride was injected into the umbilical vein soon after the infant was born. There was an immediate gasp, slight increase of tonus, short apnea, and then a better cardiac impulse. The color improved quickly and the respiratory rate became more regular. The infant was given a second dose of alpha-lobeline hydrochloride when it was thought that the improvement was not satisfactory. This time there was a marked increase in the rate of the respiratory movements and tremendous increase in their amplitude. One-half hour later there were still extensive excursions of the thorax and regular rhythmic respiration. The infant was discharged in good condition at the end of twelve days.

The majority of cases of asphyxia neonatorum responded favorably to the following procedure:

Immediately after delivery we aspirate all mucus, debris and amniotic fluid that may obstruct the passageways. For this purpose we employ the method of suction and intubation described by Litchfield and Hardman.[13] Next, the cord is clamped and alpha-lobeline hydrochloride is injected into the umbilical cord. The child is held with the head downward, and the cord stripped so that the drug is gradually pushed on its way into the general circulation. Immediately after this the patient is examined by laryngoscope and the air passages insufflated with a mixture of oxygen (93 per cent) and carbon dioxide (7 per cent) under a pressure not exceeding 5 mm. of mercury. Pure oxygen is insufflated if anesthesia was used during delivery.

Under this treatment the initiation of respiration is often noted within a few seconds in the asphyxiated newborn infant. According to our experiences it is best to continue giving the oxygen and carbon dioxide mixture, or oxygen alone, through a face mask depending upon the needs of the patient. Treatment should begin without delay, since it sometimes takes only fifteen or twenty seconds for alpha-lobeline hydrochloride to reach the respiratory center and manifest its activity by producing respiratory movements. The administration of this drug and the insufflation should be timed simultaneously.

Alpha-lobeline hydrochloride ($C_{22}H_{27}O_2N$) is the principal alkaloid of Lobelia inflata. According to Sollmann[14] the injection of small doses of this alkaloid sensitizes the respiratory center to carbon dioxide and produces stimulation of the respiration.

From a review of the cases herein mentioned we came to the following conclusions:

*Artificial Respiration.*—Artificial respiration if the baby is breathing is useless and can even be harmful. If the child has not breathed it should never be used. All the methods rely on the rhythmic expression of air from the lungs and its rhythmic return. In the newborn infant the lungs are relatively solid, there is no air to express and

when these maneuvers are performed the child is exposed to varying degrees of trauma, exposure, increase of shock.

*Drinker Respirator (Iron Lung).*—This respirator is excellent in maintaining respirations once they have been established. It cannot be used for a baby who has not breathed. This is because a marked negative pressure would be needed to open the lungs and initiate the first respiration, which would then have to be followed by an immediately reduced pressure to maintain said respiration. Such a technique, as far as we know, has not been perfected. It would also be difficult to have the machine available when needed. The Drinker respirator plays no part in resuscitation of the newborn infant.

*Mouth to Mouth Insufflation.*—This method, dating back to antiquity, is dangerous, especially when used by the inexperienced. Alveoli are easily torn, infection produced, and it is not without danger to the operator. However, it does place oxygen in the bronchial tree and stomach and as this oxygen is slowly absorbed improvement occurs. Although babies are killed by this method many are saved. It should only be used as a last resort.

*Tracheal Catheters and Tubes.*—This method, whether utilizing a flexible rubber catheter or a rigid tube as advocated by Flagg, simply places oxygen in the trachea (in the Flagg method by direct vision). Twelve millimeters of mercury is the highest pressure that should be used. Although this method will not open alveoli it does greatly benefit babies if their condition is not too bad and they have sufficient circulation to absorb oxygen by means of the bronchial mucosa. It is a more refined and safer method than mouth to mouth insufflation.

*Inhalator.*—The application of a mask to the baby's face supplying oxygen or other gases is useful if the baby is gasping or breathing, but utterly useless in the nonbreathing child. Many babies die because of a false reliance on the inhalator. Even if the mask is held tightly over the mouth and nose and the rubber bag compressed, the only effect is to force oxygen into the trachea and stomach. When so used it is similar to mouth to mouth insufflation but cleaner and more hygienic.

*Pulmotors and Resuscitators.*—These machines have little or no place in the nonbreathing baby. If they employ suction they are absolutely contraindicated because no air is present to be removed. If a small amount of air has been forced into the trachea it is removed by the suction, or if a small area of lung should be open, suction immediately restores it to atelectasis.

When these machines employ pressure only, the effect is essentially similar to mouth to mouth insufflation or rhythmic pressure on an inhalator bag. These machines will not open alveoli, and at best, place air or oxygen in the bronchial tree and stomach. They are not as effectual as a tracheal catheter or a rigid tube because in severe

asphyxia there is usually a complete collapse of the soft tissues of the throat. This produces a definite obstruction and the instrument (if it is of the pressure suction type) starts to click very rapidly. When this occurs it should be removed promptly as precious time is being lost, and a tracheal tube or catheter inserted to overcome the obstruction diagnosed by the clicking of the instrument.

### DRUGS

### *(Respiratory and Vasomotor Stimulants, Cardiac Restoratives, Analeptics)*

Adrenalin occasionally saves the life of a baby, especially when injected directly into the heart cavity. We know of two such cases and this technique should always be tried when everything else has failed, if not sooner.

Alpha-lobeline hydrochloride has been found by us to be a safe and effective analeptic and respiratory stimulant. It is not a cardiac stimulant. Alpha-lobeline hydrochloride lowers the carbon dioxide threshold of the respiratory center. Its action is transitory and consequently requires repeated administration. The effectiveness is not diminished by repeated dosage. The usual dosage of alpha-lobeline hydrochloride in neonatal asphyxia is grain $\frac{1}{20}$ injected into the umbilical vein. The umbilical vein may be easily identified since it is larger and more tortuous than the two accompanying arteries. The dose should be injected slowly into the vein which will bring about the expected stimulating effect on respiration within fifteen to twenty seconds. In case the circulation in the cord vessels is impaired, has ceased, or the cord already been cut, the product may still be injected into the umbilical vein but to assure entrance into the infant's circulation, it will be necessary to force the drug through the vein by carefully and slowly "milking" or "stripping" the cord toward the baby. If this administration is not practicable the drug may be given intramuscularly, and the dosage repeated after ten to fifteen minutes if necessary.[15]

### SUMMARY

*Our Recommendation.*—Immediately after delivery suck out the air passages with a catheter. Then, with the aid of a good light, survey the baby carefully and determine his condition. If he does not breathe on mild peripheral stimulation but has a satisfactory circulation and is not unduly limp, the simple method of resuscitation should be sufficient. This consists of further suction, clamping and cutting the cord long (twelve inches or more from the baby), injecting the umbilical vein with grain $\frac{1}{20}$ alpha-lobeline hydrochloride, stripping the drug slowly into the general circulation and after a few respiratory gasps the application of a mask to the baby's face supplying pure oxygen. The baby should be kept warm and after five or ten minutes oxygen

and carbon dioxide mixtures may be employed to deepen the respirations. If the baby is in desperate condition, that is, with little apparent circulation, pallid, the tissues jellylike in consistency, a combined technique should be immediately employed as follows:

*Combined Technique.*[15]—The umbilical vein is injected and stripped to just short of the halfway mark. A clamp is applied here to prevent the blood from returning toward the site of injection. (So far the initiating substance has not entered the circulation but is in the blood of the cord ready for subsequent use.) The next step consists of introducing a rubber catheter, or better, a rigid tube into the trachea by means of an infant laryngoscope. When a rigid tube is used, the baby should lie on a table with the head over the edge in hyperextension. Thorough suction of the larynx and trachea is performed. Insufflation of oxygen under intermittent pressure (5 to 12 mm. of mercury) is then started. Immediately afterwards the initiating drug is slowly milked into the circulation by further stripping of the cord, a sufficient amount being introduced to bring about a definitive gasp and some subsequent respirations. The oxygenation of the blood quickly improves the circulation and also renders the respiratory center more sensitive. After the withdrawal of the catheter or tube an inhalator can be used advantageously to deepen and quicken the respirations. A mixture of oxygen (7 per cent) and carbon dioxide (93 per cent) is effective for this purpose. This is continued until the child is out of immediate danger. It is our opinion that this technique gives the best possible hope of saving desperate cases.

REFERENCES

1. Henderson, Y.: J. A. M. A. **90**: 583, 1928.
2. Henderson, Y.: J. A. M. A. **96**: 495, 1931.
3. Henderson, Y.: Am. J. Obst. & Gynec. **21**: 542, 1931.
4. Haldane, J. S.: Respiration, New Haven, 1922, Yale University Press.
5. Litchfield, H. R., and Beilly, J. S.: Asphyxia of the Newborn, M. Ann. District of Columbia **3**: No. 10, 1938, 307-312.
6. Kotz, J., and Kaufman, M. S.: J. A. M. A. **113**: 2035, 1939.
7. Lund, C. J.: Am. J. Obst. & Gynec. **43**: 365, 1942.
8. Eastman, N. J.: Am. J. Obst. & Gynec. **31**: 563, 1936.
9. Lewis, M. S.: South. M. J. **29**: 178, 1936.
10. Wilson, R. A., Torrey, M. A., and Johnson, K. S.: Surg., Gynec. & Obst. **65**: 601, 1937.
11. Wilson, R. A., and Torrey, M. A.: Am. J. Surg. **23**: 426, 1934.
12. Flagg, P. J.: Am. J. Obst. & Gynec. **21**: 537, 1931.
13. Litchfield, H. R., and Hardman, R. P.: J. A. M. A. **80**: 524, 1923.
14. Sollmann, T.: A Manual of Pharmacology and Its Application to Therapeutics and Toxicology, Philadelphia, 1932, W. B. Saunders Company, 189.
15. Wilson, R. A.: Asphyxia Neonatorum, Therapeutics of Infancy and Childhood, Philadelphia, 1945, F. A. Davis Company, Vol. 1, p. 324.

# PENICILLIN THERAPY OF PNEUMOCOCCIC MENINGITIS

## Report of a Case With Recovery Following Intraspinal, Intracisternal, and Intraventricular Administration of Penicillin

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WITH the increasing availability of penicillin more and more cases of meningitis are being treated with the drug. The following case report of a 16-month-old boy with a pneumococcic septicemia and meningitis is presented because it illustrates some of the difficulties encountered in the early use of the drug and in the treatment of a type of meningitis noted for its tendency to relapse.

The following points are of interest:

1. The failure of sterilization of the cerebrospinal fluid by sulfadiazine after an encouraging first response to the drug.

2. The apparent sterilization of the fluid by intraspinal penicillin therapy with recurrence of infection when this treatment was discontinued.

3. The final good response to penicillin when given in such a manner as to insure sterilization of the entire cerebrospinal fluid.

4. The absence of any sign of local irritation or reaction in spite of intensive intrathecal therapy with penicillin.

### CASE REPORT

R. W., a 16-month-old twin boy, was first seen on Feb. 27, 1944, with what was apparently only a severe upper respiratory infection. He was given sulfadiazine therapy in doses approximating ¾ gr. per pound per twenty-four hours but did not respond well to treatment. Fever and irritability persisted. There was no vomiting and no rash. On March 1 he was admitted to the Milwaukee Children's Hospital because of slight neck rigidity. Kernig's sign was negative. The anterior fontanel, which was calcifying, was not under increased tension.

A spinal tap done on admission to the hospital revealed cloudy fluid under increased pressure. Spinal fluid sugar was 27 mg. per 100 c.c. Culture of both spinal fluid and blood gave pneumococcus Group B (type IV, V, VI, or VIII). During his first day in the hospital the boy developed a marked convergent strabismus. No other localizing signs were present, although the child had some convulsive movements. Sodium sulfadiazine, 1.0 Gm., was administered intravenously. Oral sulfadiazine was given in doses of 0.50 Gm. every four hours. The child also received a blood transfusion. Because of the overwhelming nature of the infection penicillin was secured as soon as the results of the cultures were known.

From the Milwaukee Children's Hospital.

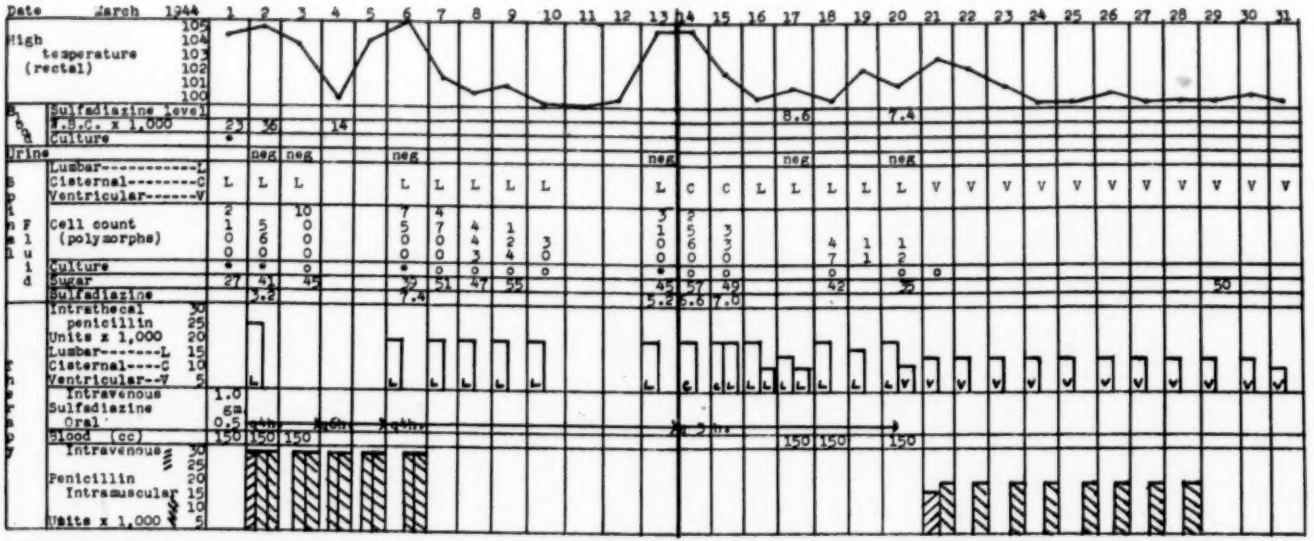
Date March 1944
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
High temperature (rectal)
105 104 103 102 101 100
Blood
Sulfadiazine Level
W.B.C. x 1,000
23 36 14 8.6 7.4
Culture
Urine
neg neg neg neg neg neg
Spinal fluid
Lumbar----------L
Cisternal--------C
Ventricular------V
Cell count (polymorphs)
Culture
Sugar
27 41 45 42 35 50
Sulfadiazine
3.2 7.4 5.2 6.6 7.0
Treatment
Intrathecal penicillin Units x 1,000
Lumbar-------L
Cisternal----C
Ventricular--V
Intravenous Sulfadiazine Oral
1.0 gm
0.5 gm q4h q6h q4h
Blood (cc)
150 150 150 150 150 150
Intravenous
Penicillin Intramuscular
Units x 1,000

Fig. 1.

On the second hospital day penicillin therapy was begun; 30,000 units were given intravenously by slow drip and intramuscular therapy was started in doses of 5,000 units every two hours. Intraspinal therapy was instituted with the administration of 25,000 units. The spinal fluid obtained at the time the penicillin was injected was clearer and under less pressure than on the preceding day showing that the sulfadiazine had been effective. Culture was still positive, however. The following day, March 3, a spinal tap revealed fluid which was more cloudy but sterile on culture. It was supposed that the increased cell count was due to the irritation of the penicillin injection. No penicillin was given intraspinally. Oral sulfadiazine and intramuscular penicillin were continued. The child's temperature dropped to normal and he semed to be doing well for sixty hours.

High fever then developed. A spinal tap revealed cloudy fluid with a positive culture. Intraspinal penicillin was administered for five successive days. The four subsequent taps showed a fluid which cleared in spite of the daily injections. The fluid was sterile at all these subsequent taps. Sulfadiazine was continued but intramuscular penicillin was stopped since it was felt that the septicemia was controlled. The child's temperature again fell to normal and again he seemed to be doing well. Intraspinal therapy was stopped after five days. All reports in the literature at that time gave five as the very maximum number of such treatments necessary. The four sterile cultures and the falling cell count gave a false sense of security.

Sixty hours after the last intraspinal injection there was a second relapse. Once again the spinal fluid was found to be cloudy and positive on culture. Intraspinal therapy was given for one day. Intracisternal treatment was then instituted. Interestingly enough, the fluid obtained at the first cisternal puncture was sterile from the preceding day's intraspinal therapy. Two intracisternal administrations were given, and then lumbar therapy was increased to twice daily. The child did not do well, however. Low grade fever persisted and vomiting began to occur. Although sulfadiazine had been given in increasing dosage, it was not felt that drug toxicity was responsible for the condition since the blood levels remained low and the urinary findings, negative. A throat culture revealed pneumococci suggesting that there might still be a focus of infection outside of the central nervous system. Chest and paranasal sinus x-rays were negative. Since the sugar of the spinal fluid was falling, it was felt that the child had an infective focus at the base of the brain with very likely an early hydrocephalus. Consequently intraventricular therapy seemed urgent.

On March 20, a craniotomy was done by Dr. David Cleveland and a catheter inserted into the left lateral ventricle. The ventricular fluid was under increased pressure but was sterile to culture. Penicillin was henceforth administered through the catheter three times daily. Intramuscular penicillin therapy was resumed because of the positive throat culture. Sulfadiazine was discontinued.

The immediate postoperative course was stormy, but within a few days the child seemed distinctly better. Within a week he was happier and more alert than at any time since his admission. On March 29 1 c.c. of phenolsulfonphthalein was injected through the catheter. Lumbar tap showed a rapid diffusion of dye throughout the cerebrospinal fluid. The catheter was removed March 31 and all penicillin therapy stopped.

The child had received a total of 995,000 units, of which 490,000 were given intrathecally, without reaction.

The child's convalescence was uneventful. The craniotomy wound healed rapidly. The strabismus disappeared and no other neurological signs were found. The boy was discharged on April 14 on his forty-fifth hospital day. At the time of writing, five months later, he appears to be an entirely normal child with physical and mental development comparable to that of his twin brother.

I wish to express my thanks to Drs. F. R. Janney, David Cleveland, Max Fox, and John Gordon for their suggestions and help in the management of this case, and my appreciation to the resident, nursing, laboratory and x-ray staff of Milwaukee Children's Hospital for their wholehearted cooperation in treatment.

# CORRELATION OF SYMPTOMATOLOGY WITH ENTEROZOIC PARASITISM IN CHILDREN

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THE current increased interest in tropical medicine resulting from our military invasion of areas endemic with parasites and their intermediate hosts has to some extent diverted our attention from our own ever-present parasitological problems. The return of our infected personnel will again unjustifiably exaggerate the tropical part of tropical medicine. Unjustifiably because propagation and perpetuation of such parasites in man occurs at the comparatively constant physiologic level of the appropriate hosts; if these hosts can survive the existing climatic environment their contained parasites will be largely unaffected by it.

While the usually accepted incidence and frequently the virulence of the prevailing enterozoic parasites in the United States are comparatively low, they, nevertheless, present and have presented constant medical and surgical problems in diagnosis and therapy. This is especially true in children where the resulting symptoms and signs are more severe and the history less revealing. Here, more so than in adults, the severity of symptomatology depends on the virulence and number of parasites present as well as the tissue susceptibility and chronological age of the child. The correlation of these and secondary symptoms with specific parasitism in 345 parasitized children follows.

## MATERIAL AND PROCEDURES

Recent, unpurged stools on 512 general hospital status children from 6 weeks to 12 years old were examined over a period of ten months at the Philadelphia General Hospital Pediatrics Department. Repeated examinations were few. Routine examinations included macro- as well as microscopic studies; the microscopic consisted of a wet saline (Ringer's) film, a wet iodine (Lugol's) film, an iron-alum-hematoxylin stained slide, and a de Revas centrifugation and frequently a zinc sulfate centrifugal flotation concentrated film. Independent correlation of symptomatology with parasitism was attempted only after the completion of the survey.*[1]

## RESULTS

The statistical results showed that of the 512 children examined, 345 (67.3 per cent) had 646 enterozoic parasites; which was 1.3 parasites per examined child, or 1.9 per parasitized child. Further analysis re-

*This survey was made possible by the assistance of Dr. J. H. Clark of the Pathology Department of the Philadelphia General Hospital, and Dr. D. H. Wenrich of the Zoology Laboratory of the University of Pennsylvania.

vealed that 41 (8.0 per cent) were *Entamoeba histolytica;* 180 (35.2 per cent), *Entamoeba coli;* 156 (30.5 per cent), *Endolimax nana;* 20 (3.9 per cent), *Dientamoeba fragilis;* 7 (1.4 per cent), *Iodamoeba buetschlii;* 165 (32.2 per cent), *Giardia lamblia;* 26 (5.1 per cent), *Chilomastix mesnili;* 7 (1. 4 per cent), *Trichomonas hominis;* 12 (2.3 per cent), *Retortomonas intestinalis;* 3 (0.6 per cent), *Ascaris lumbricoides;* 21 (4.1 per cent), *Enterobius vermicularis;* 2 (0.4 per cent), *Trichuris trichiura;* and 6 (1.2 per cent), Taenia sp.[2]

### SYMPTOMATOLOGY CORRELATED WITH PARASITISM

The medical history and the symptoms elicited prior to stool examinations contained much of the pertinent information; the remainder was obtained following laboratory proof of enterozoic parasitism. The determined correlation is presented in Table I.

### SPECIFIC SYMPTOMATOLOGY

*Amoebiasis.*—Seven of the forty-one cases with *Entamoeba histolytica* had acute, moderately severe, nonfulminating dysentery. The five to fifteen copious, loose, daily stools contained microscopic blood and *E. histolytica trophozoites.* Intermittent constipation and diarrhea, tenesmus, and moderate malnutrition were present in all seven; three were admitted as malnutrition cases. Examination showed generalized abdominal tenderness accentuated over the right iliac fossa. Three (42.9 per cent) of the seven had hyperparasitism, one with *Taenia sp., Trichuris trichiura, Giardia lamblia,* and *Iodamoeba buetschlii.*

Eleven gave history of chronic, recurrent diarrhea. Their examined stools, four scybalous, contained only *E. histolytica* cysts. There was moderate right lower quadrant tenderness in four. Nine were considered underweight.

Twenty-three (56.3 per cent) were carriers without symptomatology. Thirty-four (83.9 per cent of the children with amoebiasis were admitted for symptomatology not directly ascribable to parasitism.

Emetine, carbarsone, or both, in dosage conforming to the age of the patient gave satisfactory clinical results. No subsequent examinations were made.

*Entamoeba coli, Endolimax nana, Dientamoeba fragilis,* and *Iodamoeba buetschlii* produced no ascertainable, specific symptomatology. The gastroenteritis history occurred in cases with symptom-producing hyperparasitism.

*Giardiasis.*—Of the 165 with *Giardia lamblia* fifteen had acute, generalized abdominal aches and pains, intermittent diarrhea (from three to seven loose stools daily) and constipation. Three (20 per cent) had stools containing excess mucus and detectable blood. All fifteen patients were irritable, inattentive, and had moderate flatulence. Only one had significant hyperparasitism.

TABLE I. SYMPTOMATOLOGY AND PARASITISM

| PARASITE | TOTAL SPECIES | | SYMPTOMS OF PARASITISM (HYPERPARA) | | GASTRO-ENTERITIS, ACUTE (HISTORY) | | U.R.I. INFECTIONS (REPEATED) | | OTHER INFECTIONS | | NUTRITIONAL DISEASES (MALNUTRITION) | | BLOOD DISEASES | | TRAUMATIC CONDITIONS | | ALL OTHERS | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NO. | % | NO. | % | NO. | % | NO. | % | NO. | % | NO. | % | NO. | % | NO. | % | NO. | % |
| Entamoeba histolytica | 41 | 8.0 | 7 (3) | 17.1 (7.3) | 0 (11) | – (26.7) | 19 (7) | 46.4 (18.0) | 6 | 14.7 | 3 (16) | 7.3 (38.9) | 1 | 2.4 | 2 | 4.8 | 3 | 7.5 |
| Entamoeba coli | 180 | 35.2 | 0 (6) | – (3.3) | 0 (4) | – (2.2) | 100 (6) | 55.5 (3.3) | 34 | 18.9 | 12 | 6.7 | 3 | 1.7 | 3 | 1.7 | 28 | 15.6 |
| Endolimax nana | 156 | 30.5 | 0 (9) | – (5.8) | 0 (2) | – (1.3) | 99 (8) | 63.3 (5.1) | 25 | 16.1 | 14 | 9.0 | 2 | 1.3 | 2 | 1.3 | 14 | 9.0 |
| Dientamoeba fragilis | 20 | 3.9 | 0 (1) | – (5.0) | 0 (1) | – (5.0) | 12 (1) | 60.0 (5.0) | 2 | 10.0 | 2 | 10.0 | 1 | 5.0 | 1 | 5.0 | 2 | 10.0 |
| Iodamoeba buetschlii | 7 | 1.4 | 0 (2) | – (28.6) | 0 | – | 4 (1) | 57.1 (14.3) | 1 | 14.3 | 1 | 14.3 | 0 | – | 1 | 14.3 | 0 | – |
| Giardia lamblia | 165 | 32.2 | 15 (7) | 9.1 (4.2) | 0 (23) | – (13.8) | 99 (29) | 60.0 (17.4) | 34 | 20.6 | 10 (7) | 6.1 (4.2) | 2 | 1.2 | 1 | 0.6 | 4 | 2.4 |
| Chilomastix mesnili | 26 | 5.1 | 1 (2) | 3.8 (7.7) | 2 | 7.7 | 13 (3) | 50.0 (10.5) | 5 | 19.3 | 1 | 3.8 | 0 | – | 1 | 3.8 | 3 | 10.5 |
| Trichomonas hominis | 7 | 1.4 | 0 (1) | – (14.3) | 1 | 14.3 | 4 | 57.2 | 1 | 14.3 | 0 | – | 0 | – | 0 | – | 1 | 14.3 |
| Retortomonas intestinalis | 12 | 2.3 | 0 (2) | – (16.6) | 1 | 8.3 | 5 | 41.8 | 3 | 25.0 | 1 | 8.3 | 0 | – | 0 | – | 2 | 16.6 |
| Ascaris lumbricoides | 3 | 0.6 | 2 (1) | 66.7 (33.3) | 0 (2) | – (66.7) | 0 (2) | – (66.7) | 0 | – | 0 (2) | – (66.7) | 0 | – | 1 | 33.3 | 0 | – |
| Enterobius vermicularis | 21 | 4.1 | 20 (3) | 95.2 (14.3) | 0 (7) | – (33.3) | 1 (11) | 4.8 (52.4) | 0 | – | 0 | – | 0 | – | 0 | – | 0 | – |
| Trichuris trichiura | 2 | 0.4 | 1 (1) | 50.0 (50.0) | 0 (2) | – (100.0) | 1 (1) | 50.0 (50.0) | 0 | – | 0 (1) | – (50.0) | 0 (1) | – (50.0) | 0 | – | 0 | – |
| Taenia sp. | 6 | 1.2 | 4 (1) | 66.7 (16.6) | 0 (6) | – (100.0) | 2 (1) | 33.3 (16.6) | 0 | – | 0 (5) | – (83.3) | 0 | – | 0 | – | 0 | – |
| Total species | 646 | 126.3 | 50 (39) | 7.7 (6.0) | 4 (56) | 0.6 (8.7) | 359 (70) | 55.6 (10.8) | 111 | 17.3 | 44 (31) | 6.9 (4.6) | 9 (1) | 1.4 (0.2) | 12 | 1.8 | 57 | 8.9 |
| Nonparasitized | 167 | 32.6 | 0 | – | 69 | 41.3 | 54 (6) | 32.3 (11.1) | 21 | 12.6 | 8 | 4.8 | 2 | 1.2 | 4 | 2.4 | 9 | 5.4 |
| Total cases involved | 345 | 1.87 | 42 (34) | 12.2 (10.0) | 3 (42) | 0.9 (12.5) | 174 (61) | 50.5 (17.7) | 58 | 16.8 | 24 (24) | 6.9 (6.9) | 5 (1) | 1.4 (0.3) | 10 | 2.9 | 29 | 8.4 |

"Symptoms of parasitism" are frequently vague, and nonspecific. "(Hyperpara)" indicates, in parenthesis, the hyperparasitism in this vertical column only. "(History)" indicates previous recurrent episodes of gastroenteritis suggestive of parasitism. U. R. I. infections include coryza, sinusitis, pharyngitis, laryngitis, and tracheobronchitis or combinations. The frequent recurrence of these conditions is in parenthesis as "(Repeated)". "(Malnutrition)" pertains to the symptom rather than to disease entity.

Twenty-three had history of repeated diarrhea suggestive of giardiasis, but without laboratory proof. One hundred twenty-seven (77 per cent) had no acute or chronic specific symptomatology which could be ascribed to giardiasis.

Appropriate dosages of atabrine relieved the acute symptoms and removed or decreased the number of *G. lamblia.*

One 4-year-old child with innumerable *Chilomastix mesnili* trophozoites and cysts had diarrhea, abdominal tenderness, and mild flatulence without other ascertained etiology. Another, 6 years old, had from three to five loose stools daily containing numerous *Trichomonas hominis,* and no isolated diarrhea-producing organism. No specific therapy was given in either case.

*Ascariasis.*—The children with *A. lumbricoides* had generalized abdominal aches and tenderness, with episodes of rather colicky epigastric pains. Both gave history of similar previous episodes and showed moderate malnutrition. The other was admitted for traumatic lacerations and had no symptoms of ascariasis; this stool contained but few ova.

Caprokol (hexylresorcinol) relieved these symptoms; several discharged adult worms were recovered.

*Enterobiasis.*—Twenty had pruritis ani with disturbed sleep, irritability, and inattentiveness. The other (4.8 per cent) was a 7-month-old infant.[2]

Appropriate doses of gentian violet and protection from reinfection from contaminated fingers gave a symptom-free hospital period. Subsequent examinations were not done.

*Trichuriasis.*—One child with *T. trichiura* had excessive mucus in stools, tender colon, periodic diarrhea, anemia, and malnutrition. This was the hyperparasitized case previously mentioned. The other patient was admitted for coryza but presented a history of similar gastrointestinal disturbances.

Caprokol relieved the symptoms; the malnutrition and the normocytic, hypochromic anemia were corrected.

*Teniasis.*—Four of the six patients had flatulence, intermittent constipation, and diarrhea, abdominal tenderness, erratic appetite; these and one other (83.3 per cent) had malnutrition. The other had symptoms referable only to a nasopharyngitis.

Male fern was efficacious in the treatment of all six cases.

### CORRELATED SYMPTOMATOLOGY

Acute gastroenteritis was present in only 0.9 per cent of the parasitized cases as compared with 41.3 per cent of the nonparasitized. Two conditions may account for this: First, gastroenteritis with parasitism was ascribed in Table I to the parasite only, and actually might have been produced by two coexisting etiological agents: Second, the in-

creased peristalsis and purgation from gastroenteritis, as well as from severe catharsis, diluted the stool and purged the contained unattached lumen-dwelling parasites, thereby eliminating their later appearance.[4] Flagellates due to their locomotion were more easily found (Table I).

Upper respiratory infections were more frequent in parasitized (50.5 per cent) than nonparasitized (32.3 per cent) children; likewise, recurring upper respiratory infections were correspondingly higher. The difference was probably large enough to be significant.

## SUMMARY

1. Six hundred forty-six enterozoic parasite species were found in 512 surveyed or 345 parasitized children. Only 7.7 per cent of the surveyed parasites caused specific symptoms. Group symptomatology and therapy are described.

2. Few cases of gastroenteritis from causes other than surveyed parasitism had observed parasites.

3. Symptomatic parasitism may predispose the host to superimposed and frequently recurring upper respiratory infections.

## REFERENCES

1. Brown, Royal L.: Diagnosis of Enterozoic Parasitism in Children, J. Lab. & Clin. Med. In press.
2. Brown, Royal L.: Incidence of Enterozoic Parasitism in Children: A Survey, J. PEDIAT. 26: 61, 1945.
3. Brown, Royal L.: Enterozoic Parasitism in Infants. In press.
4. Brown, Royal L.: Effect of Gastroenteritis on Enterozoic Parasites, Am. J. Digest. Dis. & Nutrition. In press.
5. Craig, C. F.: Amoebiasis in Modern Medical Therapy in General Practice, David P. Barr, Editor, Baltimore, 1940, William & Wilkins Company, vol. 2, p. 1830.
6. Faust, E. C.: J. PEDIAT. 2: 53, 1933.
7. Faust, E. C.: Human Helminthology, ed. 2, Philadelphia, 1939, Lea & Febiger.
8. Kessel, J. F., and Sinitsin, O.: J. Parasitol. 24: 433, 1938.
9. Leake, C. D.: J. A. M. A. 98: 195, 1932.

# PENTOSURIA WITH DIABETIC SYMPTOMS

## Case Report

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Milwaukee, Wis.

PENTOSURIA is dismissed very briefly or omitted in most textbooks.[1] Apparently the condition is a rarity in children. Boek[2] has recently published a complete review of the literature on the benign melliturias. His statement that "the condition is of no clinical significance since the metabolism of carbohydrates is not impaired" prompted me to report this case in detail.

### CASE REPORT

F. E. (a Jewish male infant) was born June 8, 1940, of an uneventful first pregnancy in a healthy young mother. He was a full-term normal infant who weighed 7 pounds and measured 20 inches in length. I examined the infant in the hospital when he was 1 week of age and have had him under my care since. The father's father and the father's father's brother and the mother's grandmother have diabetes mellitus. The infant was seen regularly at the office, and there was nothing unusual in his development. He was breast fed for four months and then given an evaporated milk formula. Cereals were introduced at 4 months and vegetables at 6 months. The birth weight was doubled at 4 months and tripled at 15 months. The body length was 24 inches at 4 months and 30¼ inches at 15 months. At 10 months of age the baby weighed 19 pounds, 6 ounces and measured 28½ inches. He was rather thin but nothing abnormal was found on routine examinations.

On April 15, 1942, at 22 months of age the mother brought the infant to the office because "he eats all of the time, steals and hides food, drinks a lot of water and often, and wets himself often and a great deal." He weighed 24¼ pounds and measured 33½ inches. He was thin and irritable but no other abnormality was found. The child had been indulged and fed sweets at odd times by the grandparents. The urine showed a specific gravity of 1020, and 0.1 per cent sugar (Benedict's method) was found. On April 18 the urine showed 0.1 per cent sugar; there was no acetone or diacetic at any time. On April 22 the child was sent to the Milwaukee Children's Hospital. Here the urinary sugar was found to be positive and acetone was found each day until discharge April 27, 1942. The fasting blood sugars (Milwaukee Children's Hospital) were 81 mg. on April 16, and 80 mg. on April 27, 1942. Because of the low fasting blood sugars fermentation tests and Bial's orcinol tests were done on the urine on April 22, 23, 24, 25, and 27. These proved the reducing substance to be pentose. A dextrose tolerance test on April 27 showed the following values on capillary blood: fasting 87 mg., 15 minutes after the administration of 1.75 dextrose per kilogram of body weight, 111 mg.; 30 minutes after, 116 mg.; 45 min-

utes, 108 mg.; 1½ hours after, 127 mg.; 2 hours after, 144 mg.; 2½ hours after, 127 mg.; 3 hours after, 120 mg.; 3¾ hours after, 109 mg.

The child was discharged on a low carbohydrate diet on April 27, 1942. Shortly after he developed a furunculosis which persisted for two weeks. The appetite gradually decreased until Sept. 21, 1942, when it was normal. The child weighed 27 pounds and measured 35½ inches. He was much better developed and behaved. There was a gradual increase in weight with a normal growth and development. The polyuria and pollakiuria continued until January, 1943. The urine continued to show pentose until April 17, 1944. At that time the boy weighed 33 pounds and measured 39¾ inches. The fasting blood sugars (at Milwaukee Children's Hospital) were as follows: Feb. 10, 1943, 80 mg.; June 5, 1943, 58 mg.

This case is reported because it presented a typical picture of diabetes mellitus. There was a positive family history on both sides. The infant had been thin and slow to gain weight when he suddenly developed polyphagia, polydipsia, polyuria, pollakiuria, and melituria. His hunger was so intense that he would steal food and hide it around the house. The persistent glycosuria was considered to be due to glucose. However, the fasting blood sugars and the glucose tolerance curve were all normal. This gave me a suggestion to investigate the reducing substance in the urine. Pentosuria was demonstrated. It persisted for two years during which all symptoms disappeared and the child made a normal development.

## REFERENCES

1. Von Pfaundler, M., and Schlossmann, A., editors, The Diseases of Children, English translation, Philadelphia, 1935, J. B. Lippincott Company, vol. 2, p. 52; M. G. Peterman, editor: Practice of Pediatrics, Hagerstown, Md., 1935, W. F. Prior Company, Inc., vol. 3, chap. 25, p. 10; Holt, L. Emmett, and Howland, John: Holt's Diseases of Infancy and Childhood, ed. 11, New York, 1940, D. Appleton-Century Company, Inc., p. 1359.
2. Bock, J. C.: Physiol. Rev. 24: 169, 1944.

411 East Mason Street

# BLOOD PLASMA IN THE TREATMENT OF ENCEPHALITIS LETHARGICA AND POLIOENCEPHALITIS

## A Preliminary Report

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Ardmore, Pa.

SINCE the first published report of the clinical use of pooled adult blood plasma in the treatment of disease,[1] plasma has been used in the pediatric wards of the Bryn Mawr Hospital in numerous conditions with beneficial results.

The present paper deals with two cases, one of encephalitis lethargica and one of polioencephalitis.

The first case which led to the writing of this paper was one of encephalitis lethargica.

Case 1.—The patient was a white girl (M. A. W.), aged 9 years.

*Previous History.*—During the winter of 1942 she had chicken pox. December, 1942, she had grippe followed by whooping cough and in January, 1943, she suffered a severe attack of measles and since this has been below par.

Three weeks before admission she had a moderate attack of German measles.

On May 18, 1943, she was transferred to the Bryn Mawr Hospital isolation ward with a provisional diagnosis of meningitis. The examination showed a very sick child with her eyes closed and in marked stupor. When spoken to she could be aroused and answered questions in a languid manner and complained of severe frontal and occipital headache. Her face showed a marked purpuric eruption. She was found to have a stiffness of the neck with pain on motion. All nerve reflexes were exaggerated. The temperature was 101.4° F. The pulse rate was 83 and respirations, 24. A spinal tap yielded a clear fluid with a 5 mm. pressure, containing 160 cells per cubic millimeter of which 95 per cent were polymorphonuclears. A stained smear showed no bacteria. The hemoglobin content was 82 per cent (13.4 gm.). The erythrocyte count was 4,370,000 and the leucocyte count, 17,000 with the following differential, 87 per cent polymorphonuclears, 12 per cent lymphocytes, and 1 per cent monocytes. Treatment with sulfadiazine was instituted.

May 19. The general condition appeared the same. Photophobia still persisted, also stiff neck and headache. The temperature was 101° F. A second spinal tap yielded clear fluid under 7 mm. pressure, with 137 cells per cubic millimeter of which 100 per cent were polymorphonuclears. The protein content was 97 mg.; the sugar, 80 mg. A pellicle formed on standing; it was stained for tubercle bacilli and none were found.

May 20. The temperature was lower, the other symptoms persisted.

May 21. A tuberculin patch test yielded negative results. A diagnosis of encephalitis lethargica was made in view of the following essential findings: a clear spinal fluid, a negative tuberculin test, the lack of tubercle bacilli in the pellicle, and a normal spinal sugar level. While

the protein content in both tuberculous meningitis and encephalitis lethargica are high, the sugar is reduced in tuberculous meningitis but normal in encephalitis lethargica.

Polio-meningo-encephalitis was ruled out by the spinal fluid cell count and by the lack of paralytic symptoms.

As soon as a definite diagnosis of encephalitis lethargica could be made, sulfadiazine was discontinued.

It may be assumed that in acute inflammatory involvement of the brain a state of edema exists and that this edema is at least in part responsible for pressure against the unyielding cranium, with signs of pressure, and if the condition persists produces degenerative changes through anoxemia.

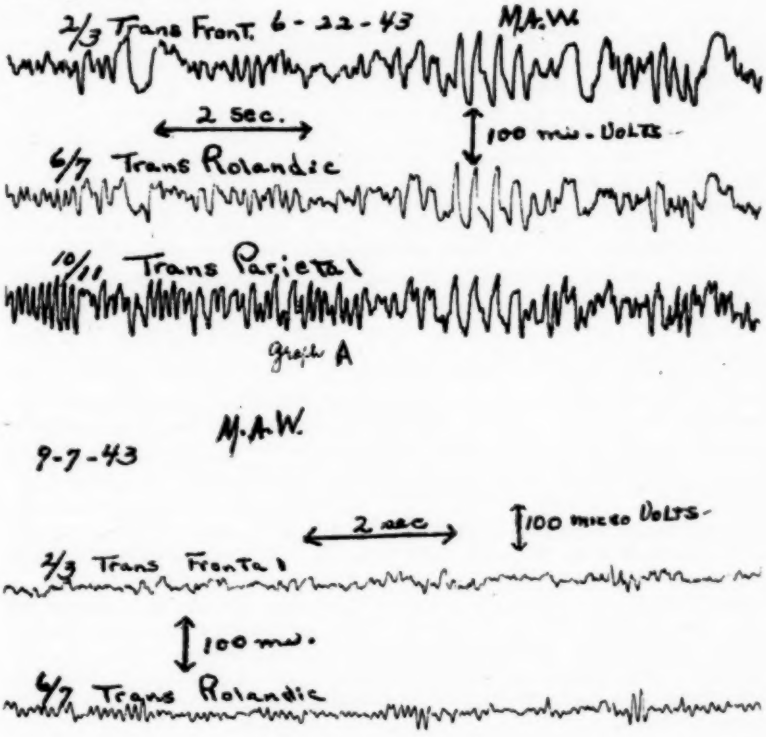


Fig. 1.—Graphs *A* and *B*.

In other words, the physical rather than direct toxic effect may be responsible for most permanent damage in cases of the encephalopathies.

To reduce this localized edema, pooled adult blood plasma was resorted to in view of previous results in shock.

Accordingly on May 21, 1943, the patient was given 100 c.c. of freshly pooled adult blood plasma, 10 c.c. intravenously, and when the needle blocked, the remaining 90 c.c. intramuscularly.

On May 22, the patient felt better, the stiffness of the neck was gone, headache was relieved, the photophobia had disappeared, and the temperature was lower. Additional freshly pooled adult blood plasma, 120 c.c., was given intramuscularly. In addition to the effect of plasma in correcting edema it was thought that by using pooled plasma preserved in the frozen state advantage could be taken of any specific or nonspecific immune bodies present.

On May 23, all symptoms were relieved and the patient was convalescing.

On June 2, the patient was discharged, clinically well.

To corroborate the clinical findings, an electroencephalogram was made June 22, 1943, at the Mental Institute of Philadelphia by Dr. Hughes, who reported as follows: "Some abnormalities chiefly in the frontal and parietal areas in both hemispheres. From an electrical standpoint the fact that these abnormalities are interspersed with normal waves is a good prognostic sign."

The child remained in good health and a second electroencephalogram was made Sept. 9, 1943. The report was as follows: "There has been marked electrical improvement in the electroencephalogram taken on M. A. W. The abnormalities noted on June 22, 1943, have disappeared. Today's record is within normal limits." (Graphs A and B, Fig. 1.)

As a result of this experience it seemed to me that in another virus condition, namely, anterior poliomyelitis, where there is also no specific cure, the same type of treatment would be applicable. In anterior poliomyelitis and its more severe form, polioencephalitis, there is a very marked edema of the tissues both of the brain and the spinal cord.

It has been suggested that the muscular paralysis from nerve cell destruction in anterior poliomyelitis is due to intense edema around the motor nerve cells depriving them of their blood supply, causing their death, and that virus itself plays only a secondary role.[2]

CASE 2.—Oct. 23, 1943, a white girl (D. W.) aged 8 years, was admitted at 6:50 P.M. to the children's ward with generalized convulsions, the third attack of the day.

*Present Illness.*—Five days before admission the child had vomited and had diarrhea, which persisted. She had a severe headache the day before admission. During the morning of the day on which she was admitted she became irrational, lethargic, and irritable. During the afternoon she had generalized convulsions and was brought to the accident ward.

*Examination.*—The examination (6:10 P.M.) revealed an irritable, confused child, rolling her eyes back in her head. The pupils were dilated but reacted to light; there was no tremor or muscular rigidity. The temperature was 99.6° F., the pulse rate was 132 and respirations, 28. The rest of the examination yielded essentially normal findings. At 6:50 P.M. she was transferred to the children's ward. At this time the child had general convulsions so severe that ether was used. Her color was poor, she was pale and cyanotic, there was dyspnea and a large amount of mucus was aspirated from her trachea.

7:15 P.M. The child was placed in an oxygen tent. Laboratory tests revealed low blood chlorides (440 mg.). On account of convulsions, from

cerebral edema, 500 c.c. of pooled adult blood plasma was given intravenously and was all absorbed by 7:45 P.M.

12:00 midnight. The patient was better but mentally confused.

Oct. 24, 1943. 1 A.M. The patient was less confused and when asked to turn over complained of generalized pain.

4 A.M. Patient was very irrational but there were no convulsions.

6:30 A.M. Child said she could not move any portion of the right side of the body.

7:30 A.M. Patient had a convulsion and was given chloral and bromide by bowel. Convulsion was soon over.

8:00 A.M. The convulsions returned and were severe. Chloral and bromide were repeated.

8:50 A.M. Child was relieved and sleeping.

11:00 A.M. Child recognized her father for the first time.

12:00 noon. There was marked improvement.

2:45 P.M. 250 c.c. of blood plasma was given intravenously.

October 25. In the morning the child was sleeping; when awakened was rational, but unable to see distinctly.

6 A.M. Child conversed with the patient in the adjacent cubicle.

7 A.M. Patient's condition very much improved; however, there was marked muscle weakness in the posterior aspect of both thighs, associated with loss of reflexes and muscle tenderness. Fine movements of both hands were impaired.

*Impression.*—Poliomyeloencephalitis. The patient was transferred to the isolation ward.

October 26. Patient had only slight power in both legs, paralysis was severe. She had occasional pains and marked tenderness in the popliteal muscles. Kenny treatment with hot packs was started and given every second hour from 8 A.M. to 8 P.M.

11:30 A.M. 250 c.c. of pooled adult plasma were given intravenously.

October 27. The patient complained of pain in the left shoulder. Kenny treatment was continued.

October 28. Pains in the legs and thighs continued and there was marked occipital headache.

October 29. 250 c.c. of pooled adult plasma were given intravenously. Hot packs were continued. Headache was severe, muscle pains and paralysis continued.

October 31. The child cried with severe headache and could not raise her head without help. She had pains in the hip, on motion radiating to the knees. Her arms were comfortable when flexed upon the chest but painful when straightened out. She had marked difficulty in swallowing and at times there were jerking movements of hands and arms.

5 P.M. Passive motion and deep breathing exercises were started. From this time on there was a gradual but steady improvement.

November 12. The temperature was 99° F. The appetite was good, for the first time. The patient was talkative and had a surprising ability in moving her arms and legs. She had no headache or muscle pains and was able to turn on her left side unaided.

December 24. The child was out of bed and walking a little but still was given hot packs and passive motion.

December 30. Hot packs were stopped.

Jan. 17, 1944. When the patient left the hospital she had a slight limp and internal rotation of the left foot, and was referred for follow-up treatment to a nurse of the Metropolitan Society for Crippled Children.

April 10, 1944. The nurse of the Metropolitan Society reported: "At this time I do not find any muscle weakness present. D. W. has now resumed her normal daily activities with daily rests morning and afternoon."

## SUMMARY

These two cases are presented at this time not because they are conclusive but to suggest a new method of treatment that might be used by others on a larger group of cases. This is done in view of the fact that in other sections of the country there are in course severe epidemics of poliomyelitis. The case of polioencephalitis reviewed here was of a severe encephalitic type, and I feel that it gave the use of blood plasma a severe test. The effect of plasma in cases of convulsions due to edema of the brain from other causes is being investigated.

## REFERENCES

1. Nicholson, Percival: J.PEDIAT. 8: 363, 1936.
2. McKhann, Charles, Wilson, James L.: Brenneman's Practice of Pediatrics, Hagerstown, Md., 1937, W. F. Pryor Co., Inc., Vol. 2, pp. 3, 4.

# News and Notes

Dr. C. M. Burpee of Augusta, Fla., died Dec. 2, 1944.
Dr. Madeline M. Melson of Little Rock, Ark., died Jan. 12, 1945.

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The meeting of Region I which was to have been held in New York in March has been cancelled.

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Attention is again called to the fact that the Examination Fee for the American Board of Pediatrics has been raised to $75 effective May 1, 1945.

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Dr. Albert D. Kaiser, 29 Buckingham Street, Rochester 7, N. Y., has accepted the position of Health Officer of Rochester, N. Y., and Professor of Child Hygiene at the University of Rochester Medical School, and will assume his new duties on April first.

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The following officers of the Academy have been appointed:

Historian: Dr. Marshall C. Pease
State Chairman, Region 2, Kentucky: Dr. William W. Nicholson
Associate Regional Chairman, Region 2, Kentucky: Dr. James W. Bruce
State Chairman, Georgia: Dr. William Willis Anderson
State Chairman, Tennessee: Dr. James C. Overall

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INSTITUTE OF MEDICAL AND VETERINARY SCIENCE
ADELAIDE, SOUTH AUSTRALIA

8th January 1945

The Editors,
The Journal of Pediatrics,
3720 Washington Avenue,
ST. LOUIS 8, MO.,
United States of America.

Dear Sirs,—

I read with interest the article by Dr. C. A. Erickson entitled "Rubella Early in Pregnancy Causing Congenital Malformations of Eyes and Heart." There are three inaccuracies which I should like to correct. The references to the work of my colleagues and myself are both wrong with regard to their page numbers, which should be 201 and 409, respectively. Dr. Erickson makes the statement "It is postulated by Swan[2] that possibly the more severe virus infections such as true measles (morbilli) may kill the fetus and cause an abortion, while rubella merely injures it and thus produces a malformation." A survey of the original paper will show that no such hypothesis was propounded. Dr. Erickson drew this inference himself, and it may well prove to be true, but in the meantime he should accept the responsibility for this view and not try to saddle me with it.

Yours faithfully,

CHARLES SWAN.

## The Children's Bureau and Crippled Children's Programs

On November 14 to November 25 the following order was issued by the Children's Bureau of the Department of Labor:

U. S. DEPARTMENT OF LABOR
OFFICE OF THE SECRETARY

Washington, D. C.
November 25, 1944

*Title 42—Public Health*

CHAPTER II—U. S. CHILDREN'S BUREAU

*Part 202—Services for Crippled Children*

Pursuant to the authority granted by section 1102, 49 Stat. 647, 42 U.S.C. 1302; section 513, 49 Stat. 632, as amended by section 506, 53 Stat. 1381, 42 U.S.C. 713, the following Amendment to section 202.4 of the regulations (42 C.F.R. Part 202) relating to services for crippled children is herewith issued:

Section 202.4 is amended by inserting, after the second sentence thereof, the following provisions: "Effective July 1, 1945, it shall be a condition of approval of a plan that it provide that diagnostic services will be made available thereunder to crippled children without restrictions as to race, color, creed, economic status, legal residence, age (except as to persons above the maximum age for which such services are legally available within the State), the necessity of referral by any person other than the child's parents or legal guardian, or similar restrictions inconsistent with the free availability of such services." (Sec. 1102, 49 Stat. 647, 42 U.S.C. 1302; Sec. 513, 49 Stat. 632, as amended by Sect. 506, 53 Stat. 1381, 42 U.S.C. 713.)

November 17, 1944
Approval Recommended

/s/ Frances Perkins
Secretary
(seal)

/s/ Katharine F. Lenroot
Chief of the Children's Bureau

This order called forth considerable adverse comment and criticism. It should be noted that it becomes effective *July 1, 1945,* and further that it refers to *diagnostic* services.

On December 26 the following memorandum was sent out to the Executive Officers of State Crippled Children's Agencies:

U. S. Department of Labor
CHILDREN'S BUREAU

Washington 25
December 26, 1944

*Memorandum*

*Subject.*—Issuance of regulation promulgated by Secretary of Labor pertaining to eligibility requirements for diagnostic services under State plans for crippled children.

Attached is a copy of an amendment to the regulations relating to services for crippled children promulgated by the Secretary of Labor

and published in the Federal Register November 21, 1944. This regulation provides that under approved State crippled children's programs diagnostic services must be available to children who apply for services without restrictions as to race, color, creed, economic status, legal residence, age (within the legal scope of the program), the necessity of referral by any person other than the child's parents or legal guardian, or similar restrictions inconsistent with the free availability of such services. Your attention is called to the fact that the provisions of the amendment become effective *July 1, 1945* and relate only to *diagnostic* services for crippled children.

In 1938 the Children's Bureau Advisory Committee on Services for Crippled Children made among others the following recommendations:

> (1) "that the State agencies make such provisions for diagnostic services as will permit the decision concerning eligibility for treatment to be based on the estimated cost of medical care in relation to social and economic resources."
>
> (2) "that State agencies assume final responsibility for determination of eligibility and seek to eliminate court-commitment procedures."

The committee recognized, therefore, that in order for a State agency to reach an intelligent decision as to the need of a crippled child for *care and treatment,* it was essential that *diagnostic* services be provided so that the nature of the crippling condition, the type and amount of medical and surgical care indicated, and the estimated cost of providing the necessary care may be known and that this information may be considered in relation to the social and economic resources of the family as a basis for determining the child's need for treatment services under the State program. Also the responsibility for such determination is to rest with the agency that administers the State program and not with any other agency, organization, or individual.

During the period of initial development of the State services for crippled children many State agencies included in their State plans provisions for certain eligibility requirements for the admission of children to diagnostic clinics. In general, these requirements pertained to age, residence, and economic status and to referral of the child by a physician.

Since 1938 the Children's Bureau has sought to carry out the recommendations of its advisory committee and the great majority of State agencies have adopted the recommendations with the result that the determination of eligibility for care and treatment is being made after appropriate medical diagnosis and after necessary social data have been obtained. The wisdom of following such a policy is more apparent at the present time than ever before in view of the widespread movement of families across State lines, the frequent lack of regular employment of the services of a "family" physician, and in some areas the unavailability of such services.

In a few States, however, there are still some requirements that a child must meet before his need for treatment services can be determined. A few State agencies, for example, make a preliminary investigation of the financial situation of the family and may declare a child ineligible for care before the medical condition is actually known. This appears to be an unsound procedure since the diagnosis and approximate cost of treatment must be known in order to decide whether or not the

family can meet these costs unaided. The requirement that a child must have lived in the given State or a given county for a period of months or years before he can receive diagnostic services is a restriction imposed by very few States; it is apparent that such a restriction may be extremely harmful to the crippled child by delaying necessary treatment. In a few States, the State agency has set up a requirement that a child can be seen in a State crippled children's diagnostic clinic only if the child has been referred to the clinic by a physician. When, as a result of such a requirement, a child is barred from receiving an examination to determine his need for care, either because of the unavailability of a physician to make the referral, the reluctance on the part of the parent to request a written referral, or for other similar reasons, it becomes apparent that such a requirement may become an obstacle to the child's receiving the care and treatment he needs. The primary intent and purpose of the provisions under title V. part 2 of the Social Security Act is to locate crippled children and to assure to all crippled children found to be in need of care the services necessary to bring about the greatest degree of physical restoration and social adjustment that can be attained.

The policy set forth in the Secretary's regulation does not represent any departure from policies usually followed in comparable public programs of medical care. In many States, for example, services and facilities for the diagnosis of tuberculosis are available to anyone who applies for such service. Similarly, medical diagnosis is made freely available to anyone who applies for services under State vocational-rehabilitation programs. The Rules and Regulations Governing Allotments and Payments to the States of Venereal Disease Funds provide that: "All health departments or clinics receiving funds shall provide facilities for (1) diagnosis and emergency treatment of all patients who apply; (2) continued treatment, consultative advice or opinion for all patients referred by private physicians; and (3) continued treatment for all patients unable to afford private medical care.

It is, therefore, sound public policy that diagnostic services be freely available to any child who applies for services under the State crippled children's program in order that the responsible public agency may determine the need for and extent of care required if the child is to have the best possible physical restoration, emotional and social adjustment, and educational and work opportunities.

On January 10 this was made available to members of the Children's Bureau Advisory Committee by Dr. A. Leonard Van Horn, Director of the Division of Health Services, who states that the statement is self-explanatory and needs no further elaboration.

On January 16 a further memorandum was sent to the State Agencies for Services to Crippled Children recommending revision of State laws to eliminate Court action as a precedent to providing services under State crippled children's programs.

This is the crux of the situation. In at least thirteen states, California, Florida, Iowa, Kansas, Kentucky, Michigan, Missouri, New York, Ohio, Oklahoma, Tennessee, Texas, and Wisconsin, the laws relating to crippled handicapped children require that before a crippled child can receive medical or hospital care the Court must determine such factors as

eligibility and need for the service, the time and duration of treatment, financial ability. In these thirteen states the official state agency is powerless to render services to the child without preliminary Court action. The Bureau feels that the State Agency is usually better staffed and equipped than the Court to decide whether the child is eligible and needs the services under the Children's Bureau program.

It is believed that the Court procedure interferes with the proper and efficient operation of the program for the following reasons:

1. That the State agency by virtue of its personnel and experience is in a better position to make a sound determination of the need for services as well as the type and duration of the treatment than can be made by a Court action which frequently refers the case to a physician not particularly trained in such work.

2. When Court commitment is necessary it involves the question of local funds which may be totally inadequate in rural areas or during periods of economic distress.

3. The question of Court commitment frequently deters families from applying for services as it is looked upon by many as a reflection on the dignity and integrity of the family.

4. Court procedure interferes with the amount and quality of the services by the State agency due to delay in getting the child under care and termination of services before completion and interferes with the standards of the agency.

It is noted that the attaining of these recommendations by revision of State laws will require legislative amendments in each State in which the practice exists, and the Children's Bureau states it would be glad to assist State officials as far as possible in reviewing the matter and to suggest various ways of meeting the problems presented in the various State laws.

# The Pediatrician and the War

### The Pediatrician and the War

The following Fellows of the American Academy of Pediatrics have been promoted:

*Army*

Captain Abraham Tow, New York, N. Y., to Major.
Captain Charles E. Ward, Jackson, Miss., to Major.

*Navy*

Lieutenant Commander Stanley Laub, USNR, Detroit, Mich., to Commander.

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"In the name of the President of the United States, it gives me great pleasure to award this Bronze Star Medal to:

CAPTAIN GEORGE M. LYON, MC,
UNITED STATES NAVAL RESERVE

CITATION:

'For meritorious performance of duty as Chemical Warfare Officer on the Staff of Commander, United States Naval Forces in Europe, during the period August, 1942 to September, 1944.

'Captain Lyon, by his force of character, industry, intense interest and special knowledge in the field of Chemical Warfare has been largely responsible for the development—not only in the Medical Department, but in all departments—of an appreciation and understanding of the possibilities of Chemical Warfare. He was chiefly responsible for the training in defense against Chemical Warfare of the naval forces organized in the United Kingdom for the assault on North Africa, and more recently organized the program of instruction for all Naval personnel engaged in the operations against the coast of France. As a result of this indoctrination, the Naval Forces involved were prepared to a very high degree to take proper measures if they had been confronted with the use of chemical agents. By his individual effort he has established and maintained liaison with all branches of the services and civilian agencies which were doing investigative work in this field in the United Kingdom, and as a result has transmitted much valuable information to the Navy Department.

'The imaginative professional ability and unselfish devotion to duty displayed by Captain Lyon during this period were in keeping with the best tradition of the United States Naval Service.'

HAROLD R. STARK
Admiral, U.S. Navy,
Commander, U.S. Naval Forces in Europe."

"The Commander in Chief, United States Pacific Fleet takes pleasure in commending

COMMANDER DOUGLAS D. MARTIN (MEDICAL CORPS), UNITED STATES NAVAL RESERVE

for service as set forth in the following

CITATION:

'For meritorious and efficient performance of duty as Chief of Medical Service at a fleet hospital in the South Pacific area from May 21, 1943 to March 25, 1944. During this period, Commander Martin displayed exceptional professional skill in handling the many medical problems which arose. Through his organizational ability and thorough indoctrination of the medical officers and nurses under his supervision, he contributed materially to the efficient administration of the hospital to which he was attached. His initiative and leadership were in keeping with the highest traditions of the naval service.'

C. W. NIMITZ,

Admiral, U. S. Navy.

Commendation Ribbon Authorized."

# Book Reviews

**Lectures on Diseases of Children.** Sir Robert Hutchinson and Alan Moncrieff, ed. 9, Baltimore, 1944, Williams & Wilkins Company, 478 pages. Price $6.75.

This is the ninth edition of the standard English text on pediatrics first published by Dr. Hutchinson forty years ago. Dr. Moncrieff has thoroughly revised the eighth edition keeping the text in line with pediatric progress and development. It is written in a delightful colloquial sort of a way that makes it good reading in contrast to the rather formal stilted style of most texts.

**Brush Foundation Study of Child Growth and Development, II Physical Growth and Development.** Katharine Simmons, Monograph of the Society for Research in Child Development, Washington, D. C., 1944, National Research Council, 87 pages.

A summary and statistical analysis of the anthropometric data from the Brush Foundation Study. The data are based on longitudinal studies made over a period of years which were started a number of years ago by the late Dr. T. Wingate Todd. This is companion to the part I of the series on Psychometric Tests published last year.

**Orthopedic Nursing.** Robert Funsten, M.D., and Carmelita Caldwood, R.N., A.B. St. Louis, 1943, The C. V. Mosby Company, 602 pages. Price $3.75.

This is a timely book in view of the rapid increase of orthopedic conditions developing from the war. Both authors are well qualified for the task they have undertaken. A consideration of the general features of orthopedic nursing is followed by sections on bone disorders, acute and chronic joint inflammations, fractures, etc. The book is modern in viewpoint and up to date, as shown by an excellent description of the Kenny technique which the authors present in a fair and unimpassioned manner.

**Mitchell's Pediatrics and Pediatric Nursing.** Revised by Robert A. Lyon, M.D., and Winifred Kaltenbach, B.A., R.N., Philadelphia, 1944, W. B. Saunders Company, 504 pages. Price $3.

This is an entirely revised and reset edition of the late Dr. A. Graeme Mitchell's text on pediatric nursing. In that it is not so detailed, and

emphasizes nursing more and pediatrics less, the text is an improvement on the first edition. The text covers the usual material used in teaching pediatrics to nurses. Not a few of the illustrations such as cleft palate, meningocele, etc. add nothing to the value of the text.

**Re-education in a Nursery Group, A Study in Clinical Psychology.** Ruth W. Washburn, Monograph of the Society for Research in Child Development, Washington, D. C., 1944, National Research Council, 175 pages. Price $2.

A discussion of the Nursery Group at the Yale Clinic of Child Development. With the increasing interest in the children of pre-school age and the rapid expansion of nursery schools, this monograph is of interest. It discusses the organization of the Nursery Group and illustrates a number of concrete problems with individual case discussion.

**Children's Bookshelf.** A booklet for parents, Children's Bureau Publication 304, Superintendent of Documents, Washington 25, D. C. Price 10 cents each.

An excellent compilation of good books for children giving author, price, and publisher. The selections are arranged by character and by age. The pamphlet should serve as a useful guide for parents and others in selecting books for children.

**The Baby Manual.** Herman N. Bundesen, M.D., New York, 1944, Simon and Schuster, Inc., 590 pages. Price $3.

According to the foreword some 21 million copies of the booklet *Our Babies* compiled many years ago by Dr. Bundesen, Health Commissioner of Chicago, and revised from time to time have been distributed. The present book is an outgrowth of the booklet. It discusses pregnancy, the care of the baby both well and sick, and the premature infant. In part 4 the care of the baby by age periods is discussed by the question and answer method. In all, the author asks and answers about 1,000 questions. The book has the same objectives and good points as other books in the same field. The fault in all lies in the fact that babies are individuals and require individualization rather than being treated as a lot of standardized automobiles by means of instruction from a service manual.

**Body Poise.** Walter Truslow, M.D., Baltimore, 1943, Williams & Wilkins Company, 312 pages. Price $4.50.

With the increased interest in physical fitness due to the war, Dr. Truslow's text is of unusual interest. Regardless of the war body poise is a most important matter and every pediatrician should have

some definite knowledge of its mechanisms. The volume is divided in three sections. The first has to do with the fundamentals of posture, and the second with some of the pathological deviations from normal posture and their treatment, as flat feet and spinal curvature. In a third interesting section various games and sports are discussed in regard to body poise. Thus the author considers walking and swimming as having little effect. Certain others as boxing and running tend mildy to faulty posture which can be easily corrected. On the other hand certain sports as baseball, golf, and tennis, for example, tend to disproportion or lateral asymetries in development which should have counteracting physical work.

**The Experiments of Nature and Other Essays.** Irvine McQuarrie, M.D., Lawrence, Kan., 1944, University Extension Division, University of Kansas, 115 pages. Price $6.

Three lectures given by Dr. McQuarrie in 1942 at the University of Kansas under the Potter Fund. In the first essay, *The Experiments of Nature and the Advancement of Medical Knowledge,* Dr. McQuarrie presents the role of a modern medical clinic in solving the problems presented by patients with obscure clinical phenomena. Among the problems used as illustrations are edema due to the impaired ability of the liver to fabricate serum protein and the possible role of the liver in osseous metabolism. It is the author's thesis that Nature presents problems in patients the elucidation of which adds much to fundamental medical knowledge.

The second essay, *Diseases of the Adrenal Gland in Children,* is an admirable review of the conditions produced by pathological lesions of the adrenals.

In the third essay, *Impressions of Medical Conditions in Besieged China,* Dr. McQuarrie reviews the diseases which came under his observation while he was visiting professor of pediatrics at the Peiping Union Medical College 1939-40. Dietary deficiencies, eye conditions, kala-azar, and typhus are among the diseases which impressed the author while in China. The presentation is clear as well as thorough within the limits of a lecture and the essays hold the interest of the readers.